
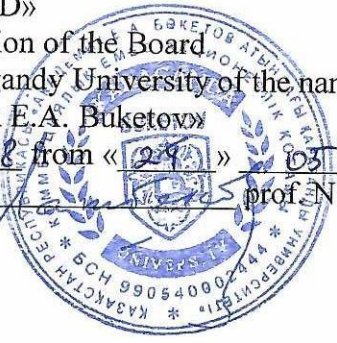


**Ministry of Science and Higher Education of Republic of Kazakhstan
Karaganda University of the name of academician E.A. Buketov**

«APPROVED»

By the decision of the Board
NLC «Karagandy University of the name of
academician E.A. Buketov»

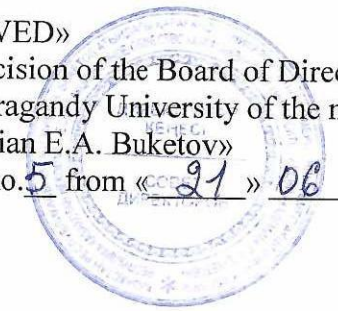
Protocol no. 8 from «29» 03 2024 y.
 _____ prof. N.O. Dulatbekov.



«APPROVED»

By the decision of the Board of Directors of
NLC «Karagandy University of the name of
academician E.A. Buketov»

Protocol no. 5 from «21» 06 2024 y.



EDUCATIONAL PROGRAM

7M05402 Mechanics

Level: Master's

Karaganda
2024

APPROVAL SHEET

EDUCATIONAL PROGRAM «7M05402- Mechanics»

«AGREED» by
Director of the Kazakhstan Multidisciplinary
Institute of Reconstruction and Development (KazMIRR)
«Karaganda Technical University named after AbylkasSaginov»



Nuguzhinov Zh.S.

«AGREED» by
Laboratory at E.A.Buketov KarU
"Applied Mechanics and Robotics"

Akhazhanov S.B.

« 11 » 04 2024г.

The educational program of the specialty "7M05402 - Mechanics" was developed on the basis of:

- the Law of the Republic of Kazakhstan from July 27, 2007 No. 319-III “On Education”
- the Order of the Minister of Education and Science of the Republic of Kazakhstan from August 31, 2018 No. 604 "State obligatory standard of the higher education"
- the Order of the Minister of Education and Science of the Republic of Kazakhstan No. 152 from April 20, 2011 “On approval of the Rules for organizing the educational process on credit technology of education”
- "Classifier of the areas for training personnel with higher and postgraduate education", approved by order of the Minister of Education and Science of the Republic of Kazakhstan No. 569 from October 13, 2018.

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Passport of the educational program

1 Code and name of the educational program: 7M05402 - Mechanics

2 Code and classification of the field of education, domains of study

The field of education: 7M05 - Natural sciences, mathematics and statistics

The domain of study: 7M054 - Mathematics and statistics

3 Group of educational programs: M093 – Mechanics, 7M054 - Mathematics and statistics

4 Volume of credits: 120 academic credits

5 Form of study: full-time

6 Language of instruction: Kazakh, Russian

7 Degree awarded: Master of Natural Sciences in the educational program «7M05402 – Mechanics»

8 EP type: ongoing

9 Level according to the ISCE: 7th level

10 Level according to the NQF: 7th level

11 Level according to the SQF: 7th level

12 Distinctive features of the EP

Partner university (JEP) - no

Partner university (DDEP) - no

13 Application number to the license for the direction of personnel training

License KZ83LAA00018495, Appendix No. 016 dated July 28, 2020

14 The name of the accreditation body and the validity period of the accreditation of the EP

Certificate of specialized accreditation SA No. 0039/1 of the IQAA agency 12/27/2014 – 12/26/2019.

15 The purpose of the EP

Preparation of masters of natural sciences in mechanics, possessing fundamental knowledge in the field of theoretical and applied mechanics, mathematics, owning modern methods of modeling and programming for their implementation in scientific, pedagogical and production activities.

16 Qualification characteristics of the graduate

a) List of graduate positions

- teacher of the disciplines of mechanical and mathematical cycles, including computer science, in higher school;
- research associate in research and calculation and experimental centers;
- engineer in research and production and manufacturing enterprises;
- software engineer in research and production organizations.
- analyst, logistician, developer, designer, tester, technologist in scientific and industrial organizations.

b) Scope and objects of professional activity for the graduate

The scope of professional activity for graduates on the educational program «7M05402 - Mechanics» are:

the field of education and science:

- teaching of disciplines of mechanical and mathematical cycles in secondary professional and higher educational institutions;
- teaching theoretical mechanics, mathematics, computer science in secondary schools;
- scientific and pedagogical activity in the field of education and science;
- research and calculation and experimental activities in the field of mechanics and technical sciences in scientific centres;
- design and production and technological activities in research and production organizations;
- the activities of the developer in the compilation and implementation of software systems for applied problems of mechanics using modern

means of computer technology;

the field of production:

- engineering activities in research and production and manufacturing enterprises;
- consulting and expert activities in research and production and manufacturing organizations;
- organizational and management activities in scientific-production and production centres;

the social field:

- administrative and management activities as a consultant, analyst, specialist of administrative bodies.

The objects of professional activity of masters on the educational program «7M05409301 - Mechanics» are:

- scientific and research centers;
- design and testing institutions;
- scientific and production organizations;
- educational institutions;
- governing bodies;
- design and technological services;
- enterprises of industrial production;
- organizations of various forms of ownership.

c) Types of professional activity of the graduate

- scientific and research;
- calculation and experimental;
- educational;
- scientific and pedagogical;
- design and engineering;
- production and technological;
- administrative and managerial;
- scientific and innovative;
- consulting and expert;
- organizational and management.

d) Functions of the graduate's professional activity

- teaching;
- research activities;
- design;
- modeling;
- construction;
- conducting experiments;
- software support;
- management.

Formulation of learning outcomes based on competencies

Type of competencies	Learning outcome code	Learning outcome (according to Bloom's taxonomy)
1. Behavioral skills and personal qualities: (Softskills)	LO 1	Owns the principles of the organization of training, demonstrates knowledge of applied philosophical, pedagogical, psychological and natural science disciplines that contribute to the implementation of the main directions of modernization of public consciousness. In his professional activity, he takes an active civic position on the priorities of competitiveness, pragmatism, mutual understanding, tolerance and democratic values of modern society.
	LO 2	Owns the basic concepts of the philosophy of science for solving problems in the field of scientific research fluently; substantiates the modern paradigm of higher education, demonstrates knowledge in the field of modern educational technologies and applies them in practice, demonstrates readiness for communication to solve problems in the field of management psychology, owns methods of commercialization as one of the profiles of the activities of state bodies, taking into account social, ethical and scientific interests in the field of professional activity.
	LO 3	Knows general, business and professional vocabulary of a foreign language to the extent necessary for professional communication, knows professional terminology and the basics of reading and translating English scientific and technical literature on mechanics, has the skills of oral and written English-language communication in the professional field of mechanics, carries out professional scientific communication for international cooperation in this subject area.
2. Digital competencies: (Digital skills)	LO 4	Possesses digital literacy in the use of digital technologies and tools for working with information, has awareness of the latest technologies and knowledge of innovative methods of working in the field of digital technologies; demonstrates readiness for the implementation of information, communication and digital technologies in educational, professional and scientific activities.
	LO 5	Has programming skills, creates information and software using standard design solutions, develops software systems using modern computer technology.
	LO 6	Applies the studied digital technologies, tools for working with information, standard programs, acquired knowledge and programming skills for conducting scientific research and solving professional problems using computer tools, constantly studies modern innovative methods of work in the field of digital technologies and use them in practice, understands the needs of introducing digital technologies into scientific and professional activities.
3. Professional competencies: (Hardskills)	LO 7	Knows the formed and systemic theoretical apparatus of the disciplines of mechanics (basic key elements and definitions, theoretical positions and statements, techniques and research methods), conducts and explains the proofs of statements, gives examples, analyses, evaluates and compares various theoretical concepts, draws conclusions.
	LO 8	Knows the basic methods for solving typical practical problems of mechanics and applies them in the study and solution of problems of a mechanical, natural-science nature and interdisciplinary areas; selects the direction of research and methods for solving problems, practically implements the solution of the problem in the chosen way, performs computational calculations if necessary, depicts the solution scheme, studies the properties of the solutions obtained, generalizes the final results, draws conclusions.
	LO 9	Owns the principles of mathematical, numerical and experimental modeling of real mechanical and natural science processes, translates real processes into mathematical and experimental models, works with abstract objects, knows how to check the adequacy of a theoretical model, justifies the choice and application of methods, techniques and typical design solutions for the study of mathematical, numerical and experimental models of mechanics.
	LO 10	Possesses basic knowledge in the field of celestial mechanics and aerodynamics as the theoretical basis of aviation and rocket technology; conducts research on the laws of movement for air flows and their interaction with obstacles and moving bodies, mathematically processes the results of the study; selects and uses optimal methods for solving practical problems; analyses and applies knowledge and understanding of facts, phenomena, theories and complex dependencies in celestial mechanics.
	LO 11	Demonstrates knowledge and understanding in the field under study, including elements of the most advanced trends in applied mechanics; substantiates the essence, methodology of application, advantages and disadvantages of various methods of applied mechanics; implements the studied methods, formulates arguments and solves professional problems of applied mechanics; consciously plans the educational proc-

		esses necessary for independent continuation of further education in the field under study.
	LO 12	Conducts independent scientific activity in the study and solution of the scientific problem posed (plans, develops and corrects the complex process of scientific research based on the studied theories of mechanical disciplines and analysis methods); solves complex scientific and technical problems of mechanics, carries out their experimental testing; evaluates current research directions in mechanics, taking into account world trends in the development of science, engineering and technologies; is able to generate his own new scientific ideas, implements proofs, solutions, calculations and a comprehensive analysis of the results obtained.

Determination for modules of disciplines in accordance with the learning outcomes

Learning outcome code	Module name	Names of disciplines	Volume (ECTS)
LO 1, LO2	Philosophical and historical aspects of social and humanitarian knowledge	History and philosophy of science	4
LO 1, LO2		Pedagogy of higher education	4
LO 1, LO2		Psychology of management	4
LO 1, LO2		Pedagogy of higher education	4
LO 3, LO 6	Professional languages	Foreign language (professional)	4
LO 3, LO 11		Professional terminology and basics of English scientific and technical literature translation on mechanics (in English)	5
LO 7, LO 6, LO 12		Basics of writing scientific papers on mechanics (in English)	
LO 4, LO 6	Modern questions of science and technique	Science-intensive innovative entrepreneurship	5
LO 11, LO 12		Commercialization of the results of scientific and technical activities	
LO 11, LO 12		Nonlinear continuum mechanics	5
LO 8, LO 9, LO11		Innovative methods in teaching mechanics	
LO 7, LO 11	Theoretical mechanics	Actual problems of classical mechanics (in English)	4
LO 2, LO 6, LO8		Methods of teaching mechanics	4
LO 9, LO 10		The basic problems and methods of celestial mechanics	
LO 5, LO 6, LO 9	Technical mechanics	Methods of the building structures calculation	4
LO 7, LO 8		Mechanics of machines and robotic systems	5
LO 7, LO 8, LO9		Fundamentals of the theory of elasticity and plasticity	4
LO 7, LO 8, LO9		Selected questions of the plates and shells theory	
LO 7, LO 8, LO9		Mechanics of planar and spatial structures	6
LO 7, LO 8, LO9		Modeling structures on an elastic foundation	
LO 7, LO 8, LO9		Computational mechanics	Additional chapters of fluid dynamics
LO 7, LO 8, LO9		Additional chapters of fluid and gas mechanics	
LO 7, LO 8, LO9		Lagrangian mechanics and nonholonomic systems (in English)	5
LO 7, LO 8, LO9		Modeling the processes of solids deformation (in English)	
LO 7, LO 8, LO9		Hamiltonian mechanics and qualitative features of body motion (in English)	5
LO 7, LO 8, LO9		Computer mechanics (in English)	
LO 11, LO 12		Research	12
LO 11, LO 12	Research work	Undergraduate research work, including internship and master thesis (URWIIMT)	24
LO 11, LO 12	Final examination	Registration and defence of master	8

Achievability matrix of learning outcomes

№	Name of disciplines	Brief description of the discipline	Number of credits	Forming learning outcomes (codes)											
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO 12
Cycle of basic disciplines University component															
D1	History and philosophy of science	It is studied with the aim of forming knowledge about the significance of scientific knowledge in its tendency to development and sociocultural profile. Questions about the philosophy, methodology of science, science as a cognitive activity and tradition are considered.	4	+	+										
D2	Pedagogy of higher education	Studied to form ideas about the modern paradigm of higher education and the theory of scientific activity in higher education. The issues of pedagogy, education of professionals-specialists, professional skills of teaching in educational organizations, pedagogical control and evaluation of knowledge in higher education are considered.	4	+	+										
D3	Psychology of management	It is studied with the aim of forming knowledge about the psychological laws of managerial activity, skills in analysis of socio-psychological principles, the characteristics of the psychology of management, the personal characteristics of the leader.	4	+	+										

D4	Foreign language (professional)	The course is taken for developing the skills and abilities of foreign language speech activity in the subject area for effective communication in situations of professional interaction. The course is designed to teach how to work with specialized literature, to practice of oral and written bilingual translation. There are considered the issues of a foreign language for specific purposes and norms of professional speech.	4			+			+								
Cycle of basic disciplines The electoral component																	
D5	Professional terminology and basics of English scientific and technical literature translation on mechanics (in English)	The purpose of studying the discipline is to obtain fundamental knowledge of professional foreign terminology in mechanics and knowledge of the main grammatical phenomena of the scientific and business style, taking into account their oral and written forms; to acquire the skill of using the received knowledge when reading and translating English scientific and technical literature on mechanics and the formation of a culture of application for business speech and writing in the professional field.	5			+											+
	Basics of writing scientific papers on mechanics (in English)	The purpose of studying the discipline is to gain knowledge about the classification and features of functional styles in English, about the basic principles of writing official documents, articles and reports; the development of undergraduates competencies aimed at forming readiness and ability to implement their own research projects and present their results in writing in accordance with the norms of the international academic community.							+	+							
D6	Science-intensive innovative entrepreneurship	The purpose of the subject is the formation of professional knowledge and practical skills of independent research, the use of quantitative and qualitative methods for conducting applied re-	5					+		+							

		search; models for assessing the market value of business enterprises requiring science; sources of financing of investment projects and the main methods for evaluating the effectiveness of investments; conducting feasibility studies of design solutions.																		
	Commercialization of the results of scientific and scientific-technical activities	The course is aimed at studying the main directions of the innovative economy, as well as at private and research centers for the development of the domestic economy and obtaining the standard of living of the population. Attention is paid to such issues as intellectual property, Innovative marketing, commercialization models, financing tools. It gives an assessment of society and has an innovative activity and a process of commercialization of research results.																	+	+
D7	Nonlinear continuum mechanics	The purpose of mastering the discipline is to obtain basic knowledge on theoretical problems arising during the movement of a continuous medium, and the formation of skills and abilities to apply approaches, methods and models of nonlinear continuum mechanics when performing scientific and practical work.	5											+	+					+
	Innovative methods in teaching mechanics	The purpose of mastering the discipline is the formation of competencies among undergraduates in the process of studying the basics of innovative activity of a teacher-mechanic, mastering the methods of diagnosing a teacher's readiness for innovative activity and technologies for preparing a teacher to work in the system of innovative education.		+	+									+						
Cycle of profile disciplines University component																				
D8	Actual problems of classical mechanics (in English)	The purpose of studying the discipline is to obtain basic knowledge about general methods of exploring arbitrary classical dynamical systems, to acquire the skill of solving problems of the motion of a solid, to develop the ability to use	4											+	+					+

		analytical methods in the research of conservative systems and rotational dynamics, and to form an understanding of fundamental physical ideas and of mathematical methods of classical mechanics.													
D9	Methods of the building structures calculation	The purpose of the discipline is to study the basic characteristics, requirements and calculation methods for building structures. The discipline contains elements of the theory of strength, dynamics and stability of building structures, complex resistance, strength under variable stresses, design schemes of structures, finite element method.	4							+	+				
D10	Mechanics of machines and robotic systems	The purpose of studying the discipline is to form the competence of the students in the field of application and development of robotic complexes and organization of automated production based on industrial robots. The discipline studies the structure, arrangement and classification of industrial robots; calculated kinematic model, tasks of kinematic research.	5							+	+				
Cycle of profile disciplines The electoral component															
D11	Methods of teaching mechanics	The purpose of the discipline is the formation of professional, pedagogical knowledge, skills and abilities required for solving educational and educational tasks of teaching mechanics from future masters of mechanics of professional qualities that provide all types of educational, extracurricular and scientific activities of masters in the scientific and pedagogical direction. The course considers introducing undergraduates to various methods of teaching mechanics and problem solving; expand the areas of application of pedagogical and psychological methods and technologies already known to undergraduates to the process of teaching mechanics; introduce modern methods	4		+				+		-				

		and give skills for their application in the process of teaching mechanics; to acquaint with the basics of theories of the formation of scientific concepts, generalized skills, cognitive interest in mechanics.																		
	The basic problems and methods of celestial mechanics	The purpose of mastering the discipline is to study the laws of unperturbed and perturbed motion of celestial bodies and artificial satellites of the earth, methods for solving the equations of motion of the bodies of the solar system and methods for determining their orbits. The discipline covers the following sections: undisturbed and perturbed motions, integrals of relative motion, integrals of equations of absolute motion.																		
D12	Fundamentals of the theory of elasticity and plasticity	The purpose of mastering the discipline is to prepare the future master to conduct independent calculations of structures based on a competent analysis of the stress-strain state of bodies under various influences. The discipline contains the following questions: the basic laws of the classical theory of elasticity and the theory of plasticity.	4																	
	Selected questions of the plates and shells theory	The purpose of studying the discipline is to master the necessary knowledge and skills in the field of the theory of plates and shells, as well as the acquisition of skills in calculating thin-walled spatial structures for strength, stability and vibrations using analytical and numerical methods.																		
D13	Mechanics of planar and spatial structures	The purpose of the discipline is to train masters of mechanics in the scientific and pedagogical direction with an in-depth study of the main methods for calculating flat and spatial structures using modern computer systems. The course considers tasks and methods for calculating flat and spatial structures; the concept of the settlement scheme; ways of	6																	

		connecting elements; geometric analysis of system formation; the concept of the degree of freedom of the system; types of loads; methods for determining forces in statically determinate systems; calculation of multi-span beams and frames; the concept of a farm; features of its design scheme; determination of efforts in the farm with a fixed load; the formation of a three-hinged arch system; determination of support reactions and internal forces; general method for determining displacements; Mohr integral; calculation of the Mohr integral by the method of Vereshchagin, Simpson, the method of trapezoids; statically indeterminate systems; force method; moving method; features of the calculation of symmetric systems.												
	Modeling a Structure on an Elastic Foundation	The purpose of the discipline is to train masters of mechanics in the scientific and pedagogical direction with an in-depth study of methods for modeling structures on an elastic foundation using modern computer systems. As a result of studying the discipline, undergraduates should receive the following knowledge and ideas: about the capabilities of modern software and hardware used to model a structure on an elastic foundation; about the main calculation methods used to model the structure on an elastic foundation; about the principles of formation of design schemes of building structures of structures; about the features of working with the most common computer systems (programs SCAD, LIRA, Ansys. etc.); on the rules for compiling initial data for calculations of building structures on a computer and interpreting the results of calculations.							+	+				
D14	Additional chapters of fluid dynamics	The purpose of studying the discipline is to develop the ability of undergraduates to understand key aspects and concepts in the field	4						+	+				

		of modern hydrodynamics; to plan and conduct scientific and theoretical research in this field. The discipline provides an expanded study of the hydrodynamics of a viscous incompressible fluid.																
	Additional chapters of fluid and gas mechanics	The purpose of mastering the discipline is the formation of knowledge of the general laws and equations of statics, kinematics and dynamics of fluids and gases; flows of incompressible and compressible flows of ideal and real fluids, research methods for their application in professional activities.																
D15	Lagrangian mechanics and nonholonomic systems (in English)	The purpose of studying the discipline is to master the basics of Lagrange mechanics by undergraduates, to acquire the skill of solving problems for finding trajectories, for minimizing action, etc., to develop the ability to use analytical methods in the research of configuration spaces, systems with rigid constraints and to form the ability to conduct independent calculations based on the principles of Lagrangian mechanics.	5															
	Modeling the processes of solids deformation (in English)	The purpose of mastering the discipline is to study modern models of solid body deformation, for which the main hypotheses underlying classical models of solid body deformation take place; to acquire the skill of solving problems in the discipline; to form a professional culture of using mathematical tools in linear and nonlinear modeling of deformation processes of solids.																
D16	Hamiltonian mechanics and qualitative features of body motion (in English)	The purpose of studying the discipline is to master the knowledge of the basic provisions and laws of Hamiltonian mechanics, to acquire skills in applying canonical transformations to solve problems of Hamiltonian mechanics, to develop the ability to use analytical methods in the research of solid motion, to form a professional culture of using mathematical	5															

		apparatus in solving applied problems of the discipline.															
	Computer mechanics (in English)	The purpose of mastering the discipline is to study analytical and numerical methods that form the basis of applied systems for automated engineering analysis, to increase the level of professional competence in solving problems of mechanics using computer technology, to acquire the skill of software implementation of problem solving, to form the ability to conduct computer calculations based on the principles of mechanical analysis.								+	+						

Coordination of the planned learning outcomes with teaching and assessment methods within the module

Learning out-comes	Planned learning outcomes for the module	Teaching methods	Methods of assessments
LO 1	Owens the principles of the organization of training, demonstrates knowledge of applied philosophical, pedagogical, psychological and natural science disciplines that contribute to the implementation of the main directions of modernization of public consciousness. In his professional activity, he takes an active civic position on the priorities of competitiveness, pragmatism, mutual understanding, tolerance and democratic values of modern society.	Discussion Round table Oral presentation	Quick survey Paper Essay writing
LO 2	Owens the basic concepts of the philosophy of science for solving problems in the field of scientific research fluently; substantiates the modern paradigm of higher education, demonstrates knowledge in the field of modern educational technologies and applies them in practice, demonstrates readiness for communication to solve problems in the field of management psychology, owns methods of commercialization as one of the profiles of the activities of state bodies, taking into account social, ethical and scientific interests in the field of professional activity.	Discussion Round table Oral presentation	Project preparation Quick survey Paper
LO 3	Knows general, business and professional vocabulary of a foreign language to the extent necessary for professional communication, knows professional terminology and the basics of reading and translating English scientific and technical literature on mechanics, has the skills of oral and written English-language communication in the professional field of mechanics, carries out professional scientific communication for international cooperation in this subject area.	Learning by experience Discussion Round table	Paper Quick survey Essay writing
LO 4	Possesses digital literacy in the use of digital technologies and tools for working with information, has awareness of the latest technologies and knowledge of innovative methods of working in the field of digital technologies; demonstrates readiness for the implementation of information, communication and digital technologies in educational, professional and scientific activities.	Method of illustrations and demonstrations Learning by experience Interactive lecture	Exercises Paper Test
LO 5	Has programming skills, creates information and software using standard design solutions, develops software systems using modern computer technology.	Problem-based learning Learning by experience Perspective learning	Practical work using digital technologies Paper, Test
LO 6	Applies the studied digital technologies, tools for working with information, standard programs, acquired knowledge and programming skills for conducting scientific research and solving professional problems using computer tools, constantly studies modern innovative methods of work in the field of digital technologies and use them in practice, understands the needs of introducing digital technologies into scientific and professional activities.	Research method Perspective learning Project-based learning	Creative work using digital technologies Paper Presentation
LO 7	Knows the formed and systemic theoretical apparatus of the disciplines of mechanics (basic key elements and definitions, theoretical positions and statements, techniques and research methods), conducts and explains the proofs of statements, gives examples, analyses, evaluates and compares various theoretical concepts, draws conclusions.	Perspective learning Interactive lecture Discussion	Written work Test Quick survey
LO 8	Knows the basic methods for solving typical practical problems of mechanics and applies them in the study and solution of problems of a mechanical, natural-science nature and interdisciplinary areas; selects the direction of research and methods for solving problems, practically implements the solution of the problem in the chosen way, performs computational calculations if necessary, depicts the solution scheme, studies the properties of the solutions obtained, generalizes the final results, draws conclusions.	Case Methods Interactive lecture Discussion	Essay writing Test Oral survey
LO 9	Owens the principles of mathematical, numerical and experimental modeling of real mechanical	Analysis and solution of problem situa-	Report

	and natural science processes, translates real processes into mathematical and experimental models, works with abstract objects, knows how to check the adequacy of a theoretical model, justifies the choice and application of methods, techniques and typical design solutions for the study of mathematical, numerical and experimental models of mechanics.	tions Learning by experience Round table	Paper Essay writing
LO 10	Possesses basic knowledge in the field of celestial mechanics and aerodynamics as the theoretical basis of aviation and rocket technology; conducts research on the laws of movement for air flows and their interaction with obstacles and moving bodies, mathematically processes the results of the study; selects and uses optimal methods for solving practical problems; analyses and applies knowledge and understanding of facts, phenomena, theories and complex dependencies in celestial mechanics.	Immersion method Interactive lecture Practical work	Katanotest Test Written control
LO 11	Demonstrates knowledge and understanding in the field under study, including elements of the most advanced trends in applied mechanics; substantiates the essence, methodology of application, advantages and disadvantages of various methods of applied mechanics; implements the studied methods, formulates arguments and solves professional problems of applied mechanics; consciously plans the educational processes necessary for independent continuation of further education in the field under study.	Business games Interactive lecture Practical work	Context task Test Written control
LO 12	Conducts independent scientific activity in the study and solution of the scientific problem posed (plans, develops and corrects the complex process of scientific research based on the studied theories of mechanical disciplines and analysis methods); solves complex scientific and technical problems of mechanics, carries out their experimental testing; evaluates current research directions in mechanics, taking into account world trends in the development of science, engineering and technologies; is able to generate his own new scientific ideas, implements proofs, solutions, calculations and a comprehensive analysis of the results obtained.	Interactive lecture Practical work Analysis, solution and calculation of tasks	Test Colloquium Written control

Criteria for assessing the achievability of learning outcomes

Codes of LO	Criteria
LO 1	Can: freely master new operations, methods and technologies for him to perform his professional duties, constantly improves, updates and replenishes his special knowledge and skills, constructively introduces new knowledge into work.
	Owens: the ability to independently determine the tasks of professional and personal development, self-education classes; the ability to consciously plan the process of advanced training and professional self-improvement.
LO 2	Knows: has an idea about ethical, spiritual and cultural values, about national traditions of different ethnic, racial and national groups, about the attitudes of society, about the main patterns and forms of regulation of social behaviour, about sociological approaches to personality, about cultural and cultural-specific knowledge, about the symbols of the state (coat of arms, flag, anthem, etc.).
	Can: perceive life habits, mores, customs, forms of behaviour, non-verbal components (gestures and facial expressions), national and cultural traditions, value systems of other peoples; behave in accordance with the values of foreign-speaking people, their attitudes and traditions; work in a team, accept social and ethical obligations, understand and respect the rights and duties of a citizen of the Republic of Kazakhstan.
	Owens: the skill to perceive the diversity of cultures and intercultural differences; the ability to successfully communicate with representatives of different cultures and nationalities; social skills related to the processes of social interaction and cooperation; the skill to work in an international context; the ability to fulfil one's civic duty.
LO 3	Can: identify sources of necessary and objective information, systematically analyze them, draw logical conclusions, and then make decisions taking into account time frames and business priorities; when making a decision, takes responsibility for his actions and the actions of his colleagues and subordinates; is capable of setting professional goals and choosing strategies to achieve them.
	Owens: ability to make decisions and implement goals, self-regulation, endurance, initiative and determination; has a personal business quality, a skill, a behaviour model, possession of which helps to successfully solve a certain business problem and achieve high results.
LO 4	Knows: the basic set of information and digital environment tools that are necessary for the safe and effective use of digital technologies and Internet resources.
	Can: solve various tasks in the field of information and communication technologies; use and create content using digital technologies, including search and exchange of information, answers to questions, and interaction with other people.
	Owens: digital skills that allow creating and sharing digital content, communicating and solving problems for effective and creative self-realization in education, work and social and professional activities.
LO 5	Knows: basics of programming, principles of algorithmization, properties and methods of describing algorithms, commands, programming languages, principles of software construction and stages of software product development.
	Can: develop stages of solving problems on a PC, apply structural and modular programming; use standard software applications; design, test and debug the created software product.
	Owens: the ability to plan and develop sequential commands for programming analytical and computing systems, the skills to create software products to perform specific professional tasks.
LO 6	Knows: has awareness of the latest digital technologies, knows innovative methods of working in the digital environment and methods of their practical implementation.
	Can: select the necessary digital tools and software products for conducting scientific research and solving professional problems and customize digital environments for personal needs; uses modern innovative methods of work in the field of digital technologies in its research activities.
	Owens: well-established, automated behaviour models based on knowledge and skills in the use of digital devices, communication applications and networks, programming skills for conducting scientific research and solving problems in the professional field.
LO 7	Knows: general patterns of scientific knowledge in its historical development and in a changing socio-cultural context; forms and methods of pre-scientific, scientific and extra-scientific knowledge; modern approaches to socio-humanitarian and natural science knowledge and their commensurability.
	Can: formulate and solve problems arising in the course of research activities and requiring in-depth professional knowledge; choose the necessary research methods; analyze and comprehend the realities of modern theory and practice based on the methodology of socio-humanitarian and natural science knowledge.
	Owens: the skill to navigate in the theories of the historical development of scientific knowledge for the development of relevant research directions in the field of his own scientific interests of professional direction; the ability to modify existing methods and to develop new methods based on the problems of a specific scientific research.
LO 8	Knows: the main provisions of the content of higher education, modern didactic concepts in higher education, features of the design and organization of the pedagogical


	<p>process at the university, modern educational technologies; fundamentals of pedagogical skills and pedagogical techniques, management in education, management of the process of formation and development of the personality of students.</p> <p>Can: formulate and solve problems arising in the pedagogical process and requiring in-depth pedagogical knowledge; analyze and comprehend the realities of modern theory and practice of higher education; diagnose and advise students taking into account the profile of future professional activity, the ability to abstract thinking, analysis and synthesis.</p> <p>Owns: the skills of conducting independent scientific and pedagogical activity; the skills of guiding the main provisions of normative documents in planning, forecasting, analysis of the main components of the learning and education process in higher education; the ability to apply methodological and methodical knowledge in conducting scientific research, educational and educational work.</p>
LO 9	<p>Knows: ways and means of increasing the work efficiency of the practical psychologist in the field of management organization; permissible boundaries and ways of influencing employees; procedure and patterns of meditative conflict resolution.</p> <p>Can: use knowledge in the field of theory and practice of organizing potential opportunities in the organizational sphere in managerial activities; applies the studied materials in the practical activities of a psychologist in the management sphere and in the field of resolving conflict situations between the subjects of interaction.</p> <p>Owns: skills of working with participants of the conflicting sides of the organizational system; skills of providing them with psychological assistance in the managerial sphere; willingness to communicate to solve problems in the field of management psychology; skills to take into account the interests, positions and motives of employees; skills for resolving professional conflicts in the organization.</p>
LO 10	<p>Knows: a foreign language to the extent necessary for obtaining professional information and communication; professional terminology; basic principles of working with scientific and technical literature of a professional orientation; basic rules for writing scientific and technical texts for working with reference materials, documents and periodicals on mechanics.</p> <p>Can: use a foreign language in interpersonal communication in professional activity; conduct written communication in a foreign language, compose business letters and scientific papers on mechanics; can to apply the acquired knowledge in his professional activity in the implementation of reading, translating scientific and technical literature on mechanics and and conducting written and oral professional communication.</p> <p>Owns: the skills of expressing one's thoughts and opinions in interpersonal and professional communication in a foreign language; skills of reading, translating and writing in a foreign language of special scientific and technical texts, reports and articles on mechanics; skills in applying the formulas of speech etiquette of communication in various formats: conferences, seminars, communication via the Internet, international cooperation.</p>
LO 11	<p>Knows: the variety of mechanisms by which the results of research work reach consumers; rights and obligations of the authors of the results of scientific and scientific and technical activities; the main provisions of the centers for the commercialization of the results of scientific and scientific and technical activities; rules for the development of high-tech innovative entrepreneurship in universities, research institutes and industrial enterprises.</p> <p>Can: commercialize the results of scientific and technical research; cooperate with organizations financing scientific developments with their subsequent implementation; improve the efficiency of commercialization and promotion of commercial use of the results of scientific, scientific and technical activities and their commercial turnover; strategically plan and manage science-intensive industries.</p> <p>Owns: the skills of creating organizations whose activities consist in the practical commercialization of the results of scientific and scientific-technical activities; the skills of obtaining intellectual property rights and the use of intellectual property objects; the skills of cooperation with organizations financing scientific developments with their subsequent implementation; the skills of researching design solutions in high-tech innovative entrepreneurship.</p>
LO 12	<p>Knows: basic theoretical positions and concepts, principles and methods of research, fundamental laws, relevant problems of the disciplines of mechanics; theoretical foundations of analytical, computational and experimental apparatus, basic tasks, leading regularities and methods of mechanics for the study and solution of mechanical problems and problems of an applied nature.</p> <p>Can: effectively work with subject elements and objects of the disciplines of mechanics, demonstrating developing knowledge and understanding in the field under study; reveals the natural-scientific essence of mechanical problems arising in the course of professional activity, and attracts appropriate mechanical-mathematical theoretical and analytical apparatus for their research.</p> <p>Owns: a holistic and systematized set of generalized basic knowledge in fundamental mechanical, mathematical, natural science and technical disciplines necessary for forming judgments and conducting research activities on mechanical, natural science and experimental problems in the professional field.</p>


Educational program graduate model

Competency types	Description of competencies
1. Behavioral skills and personal qualities (Soft skills)	<ul style="list-style-type: none"> • Academic freedom • Knowledge of languages • Competent creativity • Ethical and aesthetic culture • Tolerance • Understanding the importance of the principles and culture of academic integrity
2. Digital competencies (Digital skills)	<ul style="list-style-type: none"> • Digital literacy • Algorithmic thinking and programming • Data analysis and artificial intelligence methods
3. Professional competencies (Hard skills)	<ul style="list-style-type: none"> • High professionalism in the field of theoretical and applied mechanics and mathematics



Members of the working group:

The head Algebra, Mathematical Logic and Geometry department
named after Professor T.G. Mustafin
PhD, associate professor of Algebra, Mathematical Logic and Geometry department
named after Professor T.G. Mustafin
Master, teacher Algebra, Mathematical Logic and Geometry department
named after Professor T.G. Mustafin
Master's degree student of the M2-Mech-22-1k group of EP "7M05402-Mechanics"

N.K.Medeubaev 

R.A.Kaiyrov 

L.K.Abeuova 
U.Omarbai 

J.S.Nuguzhinov 
S.B.Akhazhanov 

Employers:

The educational program was reviewed by the Faculty Council, 19.04.24, protocol № 7
The educational program was reviewed at the meeting of the Academic Council, 29.04.24 protocol № 5
The educational program was reviewed and approved at the meeting of the University Council, 24.05.24 protocol № 8

Member of the Board. Vice-Rector for Academic Affairs
Director of the Department of Academic Work Department
Dean of the Faculty of Mathematics and Information Technology

 M.M.Umurkulova
 T.M.Khasenova
A.A.Tanin

EDUCATIONAL PROGRAM DEVELOPMENT PLAN
«7M05402 - MECHANICS»

The purpose of the Plan is to contribute to improving the quality of the conditions for the implementation of the educational program, taking into account the current requirements of the labor market and the achievements of modern science.

Target indicators

№	Indicators	Unit of measurement	2024-2025 (plan)	2025-2026 (plan)	2026-2027 (plan)	2027-2028 (plan)
1	Human resources development					
1.1	Increase in the number of teachers with academic degrees	Number of people	1	1	1	1
1.2	Advanced training in the teaching profile	Number of people	5	3	3	6
1.3	Involvement of practitioners in teaching	Number of people	1	1	1	1
1.4	Other					
2	Promotion of the EP in the ratings					
2.1	IQAA	Position	+	+	+	+
2.2	IAAR	Position	+	+	+	+
2.3	Atameken	Position				
3.	Development of educational and scientific-methodical literature, electronic resources					
3.1	Textbooks	Number			1	1
3.2	Training manuals	Number	2	1	1	1
3.3	Methodological recommendations/instructions	Number	1	1	1	1
3.4	Electronic textbook	Number	1	1	1	1
3.5	Video/audio lectures	Number	1	1	1	
3.6	Other (monographs)	Number	1			1
4.	Development of educational and laboratory facilities	Number				

4.1	Purchase of software products	Number	1		1	1
4.2	Purchase of equipment	Number				
4.3	Other					
5.	Updating the content of the EP					
5.1	Updating the learning outcomes and the list	Year				
5.2	Introduction to the EP of academic disciplines in foreign languages*	Year	+	+		+
5.3	Introduction of new teaching methods	Year	+	+	+	
5.4	Opening a joint/double two-degree program on the basis of the EP	Year				

The head of Algebra, Mathematical Logic and Geometry
Department named after Professor T.G. Mustafin



N.K.Medeubaev