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NCJISC "Kazakh Agrotechnical Research University by S. Seifullin"

Dean of the Technical Faculty

Akhmetov E.S.

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CATALOG OF ELECTIVE DISCIPLINES

For students in the direction of preparation 7M071 Engineering and engineering trades
 EPG: M103 - «Mechanics and metal working»
 EP: 7M07106 - «Mechanical Engineering»
 Form of education: Full-time (MS 2 years) semester
 Component: Elective subjects
 Level of training: Master's program by specialization (Scientific & pedagogical direction)

Brief description of the elective disciplines of the educational program

The name of discipline	Code of subject	Discipline cycle	Number of credits	Cafedra	Course	Academic period	Pre-requisites	Post-requisites	Brief content of the discipline	Key learning outcomes	Name of the alternative discipline
Methodology of scientific study	MINI 5205	BS	3.0		1	1	Bachelor's course: Philosophy, Fundamentals of patent science and professional creativity	Master student's research work, including implementation of master's thesis, Research practice	Methodology of scientific research. General scientific methods of economic research. Statistical and economic methods of research. Balance method of research, economic and mathematical modeling and method of development of target programs. Computational-constructive and experimental methods of scientific research. Functional-cost and expert research methods. Information support of scientific research. Scientific style of writing and philological support for the design of scientific work. Methods of preparation and registration of the master's thesis.	Present the basics of scientific research methodology. Apply the means of collecting, processing experimental data and analyzing the results. Make a review of literary information, formulate the results of business written and oral speech in the state and foreign languages	Organization and planning of research and innovation
Organization and planning of research and innovation	OPNIID 5205	BS	3.0	Стандартизация, метрология и сертификация	1	1	Bachelor's course: Philosophy, Fundamentals of patent science and professional creativity	Master student's research work, including implementation of master's thesis, Research practice	Methodological foundations of scientific knowledge; Planning of research work; Scientific information: search, accumulation, processing; Technical and intellectual creativity and its legal protection; General requirements for research work; the Introduction of research and their effectiveness; Methods of planning and conducting the experiment; the technique of experiments and methods of accompanying observations; Conditions of conducting, modeling, processing of experimental data.		Methodology of scientific study

Robotic systems and automation complexes of processing food raw materials	RK.A.PPS 5308	AS	3.0	Technological machines and equipment	1	1	Bachelor's course: Manipulators and robots; Metalworking simulation, Automated electric drive	Digital methods and means for measuring the parameters of technological machines; Innovative drives of machines and equipment in mechanical engineering. Methods and tools for measurement and control of technological machines, Modern technologies of machine-building production	Automation objects of processing production. Robotic technological complex, its composition, control device, equipment equipment. Programming of working cycles of the machine, modes of the technological process and auxiliary functions. Automation of typical technological processes in the meat and dairy industry. Automationschemesfortheprocessingoffoodrawmaterials.	Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products, create new types of equipment. Apply computer application programs in modeling objects, develop working documentation for samples of mechatronic robotic systems	Modern automationtechnologies processing food raw materials
Modern automationtechnologies	STA 5308	AS	3.0	Technological machines and equipment	1	1	Bachelor's course: Manipulators and robots; Metalworking simulation, Automated electric drive	Digital methods and means for measuring the parameters of technological machines; Innovative drives of machines and equipment in mechanical engineering. Methods and tools for measurement and control of technological machines, Modern technologies of machine-building production	Considers innovative projects and technologies in energy and mechanical engineering, information technologies in science and education, information technologies and automation in technical systems and management; technology and processing of organic and inorganic materials, innovative technologies and automation in the construction of buildings and structures, current problems and trends in the socio-economic development of management and education.	Choose methods and means of measurement and control of the parameters of the operation of technological machines, carry out diagnostic control of technical objects, Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products, create new types of equipment	Robotic systems and automation complexes of processing food raw materials
Modern structural materials and protective coatings in mechanical engineering	SK.MZPM 5305	AS	5.0	Technological machines and equipment	1	1	Bachelor's course: Mechanics of materials; Materials in engineering design	Master student's research work, including implementation of master's thesis, Research practice	The discipline contains information about various types of structural materials, formation of a complex of knowledge and skills for the rational use of structural materials based on metals and alloys, polymers, ceramics and composites used in mechanical engineering under given operating conditions. Knowledge of the basic concepts and provisions of the course is necessary to broaden one's horizons in the field of the latest structural materials used in mechanical engineering to obtain critical machine parts.	Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products, create new types of equipment. Formulate methodologies for the design, production, maintenance and repair of modern technological machines and create new structural materials in food industries	Material science in food industry
Material science in food industry	MPP 5305	AS	5.0	Technological machines and equipment	1	1	Bachelor's course: Mechanics of materials; Materials in engineering design	Master student's research work, including implementation of master's thesis, Research practice	Classification and properties of construction materials. The main stages of the process of obtaining blanks and machine parts. Surface finishing methods: grinding, superfinishing, honing, shevenging. Electrophysical and electrochemical methods of metal processing. Production of products by powder metallurgy. Anticorrosive and wear-resistant coatings of construction materials. Cermet products. The structure of the materials and the requirements for them. Technologicalpropertiesofmaterials.	Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products, create new types of equipment. Formulate methodologies for the design, production, maintenance and repair of modern technological machines and create new structural materials in food industries	Modern structural materials and protective coatings in mechanical engineering

Technologies and equipment of modern mechanical engineering	TOSM 5207	BS	5.0	Technological machines and equipment	1	1	Bachelor's course: Agricultural engineering technology, Technological processes and food production equipment	Modern equipment and means of mechanization of production processes of technological machines, Modern technologies of machine-building production	Formation of knowledge and skills and knowledge in the field of modern problems of science and technology for the production of machine-building products, which are necessary in a market economy and intense competition among machine-building enterprises producing technological machines and equipment. Knowledge of modern problems in the technology of production of machine-building products will allow future specialists - to have information about ensuring the performance of technological machines and equipment about innovative technologies, equipment and tools used in the production of machines, develop knowledge of new design and technological solutions in the production of machines, in the field of efficiency of high technologies in mechanical engineering; technological support for the production of products of the required quality, ensuring the competitiveness of products.	Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products, create new types of equipment	Technological equipment of the processes of processing industries
Technological equipment of the processes of processing industries	TOPPP 5207	BS	5.0	Technological machines and equipment	1	1	Bachelor's course: Agricultural engineering technology, Technological processes and food production equipment	Modern equipment and means of mechanization of production processes of technological machines, Modern technologies of machine-building production	Machines and devices are integral parts of technological complexes. Organization of food technology technologies. Machines and devices - converters of food environments. Equipment for conducting mechanical and hydro-mechanical processes (washing, cleaning and separation, calibration and sorting, grinding and enrichment of bulk materials, molding, separation and mixing of liquid-like heterogeneous food environments). Equipment for conducting heat and mass transfer processes.	Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products, create new types of equipment	Technological equipment of modern mechanical engineering
Diagnostics of technological systems	DTS 5209	BS	5.0	Technological machines and equipment	1	1	Bachelor's Course: Failure Analysis and Machine Repair	Fundamentals of technical repair and maintenance of technological machine and equipment, Progressive methods of repair of technological machines and equipment	Formation of theoretical and practical knowledge on working with diagnostic equipment for various technological systems in mechanical engineering, software for diagnosing technological equipment. As a result of studying the discipline, undergraduates will have an idea about the main problems and methods for solving problems to ensure control and diagnostics of technological equipment; know and be able to use devices, equipment for testing and diagnostics, software and mathematical software for computer diagnostics; the sequence of diagnostic studies and algorithms for processing the information received.	Choose methods and means of measurement and control of the parameters of the operation of technological machines; carry out diagnostic control of technical objects	Автоматизированная диагностика технологических машин
Автоматизированная диагностика технологических машин	ADTM 5207	BS	5.0		1	1	Bachelor's Course: Failure Analysis and Machine Repair	Fundamentals of technical repair and maintenance of technological machine and equipment, Progressive methods of repair of technological machines and equipment			Диагностика технологических систем

Innovative drives of machines and equipment in mechanical engineering	IPMOM 5309	AS	4.0	Technological machines and equipment	1	2	Bachelor's course: Pneumatic and hydraulic drives; Fluid and gas mechanics	Methods and tools for measurement and control of technological machines; Technological machine and equipment of design	Purpose - forms knowledge, skills in the field of operation, maintenance and assessment of the technical condition of drives of industrial machines; about the features of innovative designs, layout and operating modes of mechanical, hydraulic and pneumatic drives in mechanical engineering	Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products; create new types of equipment. Create analog models of hydraulic drives, systems, processes and objects; apply computer technologies for design and diagnostics	Modern equipment for water supply and ventilation systems of food production
Modern equipment for water supply and ventilation systems of food production	SODV/VP 5309	AS	4.0	Technological machines and equipment	1	2	Bachelor's course: Pneumatic and hydraulic drives; Fluid and gas mechanics	Methods and tools for measurement and control of technological machines; Technological machine and equipment of design	General characteristics of water supply and ventilation systems in food production. Classification and principle of operation of technological machines. Volumetric water pressure and ventilation systems. Auxiliary equipment. Regulating equipment. Calculation of parameters of machines for water supply and ventilation of food production. Determination of equipment performance: power, process performance, efficiency. Fundamentals of automation of the processes of water supply and ventilation of food production.	Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products; create new types of equipment. Create analog models of hydraulic drives, systems, processes and objects; apply computer technologies for design and diagnostics	Modern equipment for water supply and ventilation systems of food production
Fundamentals of technical repair and maintenance of technological machine and equipment	OTROTMO 5302	AS	4.0	Technological machines and equipment	1	2	Bachelor's Course: Failure Analysis and Machine Repair		Development of technological documentation, modernization of operating technological equipment and repair of machinery and equipment The ability to organize the process of exploitation of food processing complexes, the ability to make plans, programs, schedules, the ability to apply information technology to repair food processing complexes	Choose methods and means of measurement and control of the parameters of the operation of technological machines; carry out diagnostic control of technical objects. Formulate methodologies for the design, production, maintenance and repair of modern technological machines and create new structural materials in food industries	Progressive methods of repair of technological machines and equipment
Progressive methods of repair of technological machines and equipment	PMR/TMO 5302	AS	4.0	Technological machines and equipment	1	2	Bachelor's Course: Failure Analysis and Machine Repair		The purpose of the discipline: the study of methods for modeling technological processes of repair and operation using SolidWorks computer-aided design tools. Conduct an analysis and establish the causes of damage to parts; design a technological process for the manufacture and repair of technological machines and equipment; develop schedules for the repair of mechanical equipment	Choose methods and means of measurement and control of the parameters of the operation of technological machines; carry out diagnostic control of technical objects. Formulate methodologies for the design, production, maintenance and repair of modern technological machines and create new structural materials in food industries	Fundamentals of technical repair and maintenance of technological machine and equipment

Modern equipment and means of mechanization of production processes of technological machines	SOSMPPTM	AS	5.0	Technological machines and equipment	2	1	Bachelor's course: Installation, testing and operation of technological machines	Master student's research work, including implementation of master's thesis, Research practice	Studying the basic principles of automatic control of technological processes, basic principles of metrological support of technological processes, standard methods of product quality control; equipment used for mechanization and automation of technological processes, the specifics of quality control methods for products and objects in the field of professional activity, analysis of the causes of violations of technological processes and the development of measures to prevent them.	Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products, create new types of equipment. Choose methods and means of measurement and control of the parameters of the operation of technological machines, carry out diagnostic control of technical objects. Formulate methodologies for the design, production, maintenance and repair of modern technological machines and create new structural materials in food industries	Modern equipment for food processing
Modern equipment for food processing	SODPPP	AS	5.0	Technological machines and equipment	2	1	Bachelor's course: Installation, testing and operation of technological machines	Master student's research work, including implementation of master's thesis, Research practice	Classification of machines and equipment for processing industries; Structural elements of machines; Connection details and the main types of mechanisms; Instrumental and technological schemes of food processing industries; Technological equipment for the preparation of products for the main production operations, equipment for crushing and grinding of raw materials and semi-finished products; Equipment for the mechanical separation of processed products. Equipment for processing products and semi-finished compound.	Develop technologies for processing raw materials, apply the basics of automation of technological processes and quality control of processed products, create new types of equipment. Choose methods and means of measurement and control of the parameters of the operation of technological machines, carry out diagnostic control of technical objects. Formulate methodologies for the design, production, maintenance and repair of modern technological machines and create new structural materials in food industries	Modern equipment and means of mechanization of production processes of technological machines
Foreign language for academic purposes	YADAC	BS	2.0		2	1	Foreign language (professional)	Master student's research work, including implementation of master's thesis, Research practice	Use of a foreign language in professional and scientific activities, possession of public speaking skill, conducting discussion, the ability to work with information from various sources, edit texts of professionally content in a foreign language.	Present the basics of scientific research methodology. Apply the means of collecting, processing experimental data and analyzing the results. Make a review of literary information, formulate the results of business written and oral speech in the state and foreign languages	English for Academic Purposes
English for Academic Purposes	AYADAC	BS	2.0		2	1	Foreign language (professional)	Master student's research work, including implementation of master's thesis, Research practice	Comprehensive theoretical and linguistic, practical and informational-analytical training in order to perform functions related to the use of a foreign language in professional and scientific activities: possession of public speaking skills, conducting discussions, the ability to work with information from various sources, edit texts of professionally significant content in a foreign language.	Present the basics of scientific research methodology. Apply the means of collecting, processing experimental data and analyzing the results. Make a review of literary information, formulate the results of business written and oral speech in the state and foreign languages	Foreign language for academic purposes

Digital methods and means for measuring the parameters of technological machines	CMSIPTM 6311	AS	5.0	Technological machines and equipment	2	1	Bachelor's course: Measurement systems	Master student's research work, including implementation of master's thesis, Research practice	Formation of skills in the field of digital methods and measuring instruments. Make a choice of measuring systems for monitoring and regulating the parameters of technological processes, assess the reliability and economic efficiency of the selected measuring system. Calculates the parameters of the elements of measuring systems, in the verification and adjustment of measuring instruments for research and operation in industrial conditions	Develop technologies for processing raw materials; apply the basics of automation of technological processes and quality control of processed products, create new types of equipment. Choose methods and means of measurement and control of technological machines; carry out diagnostic control of technical objects	Methods and tools for measurement and control of technological machines
Methods and tools for measurement and control of technological machines	MPIKPTM 6311	AS	5.0	Technological machines and equipment	2	1	Bachelor's course: Measurement systems	Master student's research work, including implementation of master's thesis, Research practice	Methods and instruments for measuring and controlling processing processes and parameters of technological machines and equipment for food production. The main provisions of the differentiated process of subsurface mineral fertilization in the system of precision agriculture. Methods and technical means of measurement and process control.	Develop technologies for processing raw materials; apply the basics of automation of technological processes and quality control of processed products, create new types of equipment. Choose methods and means of measurement and control of the parameters of the operation of technological machines; carry out diagnostic control of technical objects	Digital methods and means for measuring the parameters of technological machines
Technology of processes of agricultural and food products	TPPSP 6303	AS	5.0	Agricultural and grain processing machines	2	1	Technologies and equipment of modern mechanical engineering; Technological equipment for processing industries	Master student's research work, including implementation of master's thesis, Research practice	Equipment for processing of crop production: for cleaning, washing, grinding, sorting. Devices for hydrothermal and heat processing of grain. Fundamentals of technology for processing and storage of livestock products: the production of milk and dairy products, canning, storage and processing of meat, the production of sausages and meat semi-finished products. Calculation of technological indicators and machine parameters	Develop technologies for processing raw materials; apply the basics of automation of technological processes and quality control of processed products, create new types of equipment. Formulate methodologies for the design, production, maintenance and repair of modern technological machines and create new structural materials in food industries	Modern technologies of machine-building production
Modern technologies of machine-building production	STMIP 6303	AS	5.0	Technological machines and equipment	2	1	Technologies and equipment of modern mechanical engineering; Technological equipment for processing industries	Master student's research work, including implementation of master's thesis, Research practice	A feature of modern mechanical engineering is the tightening of the operational characteristics of machines, high requirements for the quality of manufacture and their reliability. This requires the use of modern, environmentally friendly, high-performance technological equipment that ensures high processing accuracy.	Develop technologies for processing raw materials; apply the basics of automation of technological processes and quality control of processed products, create new types of equipment. Formulate methodologies for the design, production, maintenance and repair of modern technological machines and create new structural materials in food industries	Technology of processes of agricultural and food products

The catalog of elective subjects was approved by the Academic Quality Council of the Technical Faculty, Protocol No. 9 dated June 02, 2023

Head of the Department of Technological Machines and Equipment

M. T. Usurbayev