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NCJSC "Kazakh Agrotechnical Research University by S. Seifullin"

Faculty of Mechanical Engineering

Department of Mechanical Engineering

2023y.

Akimov E.S.



**CATALOG OF ELECTIVE DISCIPLINES**

For students in the direction of preparation 6B071 Engineering and engineering trades  
EPG: B064 - «Mechanics and metal working»

EP: 6B07104 - «Technological Machinery and Equipment»

Form of education: Full-time (bachelor 4 years) semester

Component: Elective subjects

Level of training: Bachelor

**Brief description of the elective disciplines of the educational program**

The name of discipline	Code of subject	Discipline cycle	Number of credits	Cate d r a	Cours e	Acade mic period	Pre-requisites	Post-requisites	Brief content of the discipline	Key learning outcomes	Name of the alternative discipline
Fundamentals of technology processing industries	OTPP 1233	BS	4.0	Agricultural and grain processing machines	1	1	School course: Physics	Agrecultural machines, Failure analysis and repair of machines; Machines and Apparatus for Processing Livestock Products; Machines and equipment for processing of crop products	The organization of the process flow as a system of processes. The structure of the process flow. Raw materials for food production. Formation of the nutritional value of the grain during cultivation. Change in grain quality during storage. Storage of raw materials and its preparation for production. The main processes of food technology, their role and impact on food quality	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of engineering, study innovative entrepreneurship and anti-corruption culture, formulate inventions	Basics of organization of wheeled and caterpillar machines
Basics of organization of wheeled and caterpillar machines	OUKGM 1249	BS	4.0	Mechanization of technological processes	1	1	School course: Physics	Agrecultural machines, Failure analysis and repair of machines; Machines and Apparatus for Processing Livestock Products; Machines and equipment for processing of crop products	General information about the design, arrangement and operation of units and systems of basic models, basic adjustments, techniques for maintaining technical condition, expanding practical skills and abilities in the field of technical operation of domestic and foreign tractors and agricultural vehicles widely used in farms.	To organize highly efficient operation of machines, apparatus, machinery and technological equipment in production, to show leadership qualities	Fundamentals of technology processing industries
Physical and colloid chemistry	FKH 2237	BS	4.0	Физика и химия	2	2	School course: Chemistry	Materials in engineering design, Metal-working machines and welding equipment	Molecular-kinetic theory of aggregative states of matter. Fundamentals of Chemical Thermodynamics (TD). Chemical kinetics. Catalysis. Chemical equilibrium. Phase balance. Solutions. Electrochemistry. Colloidal chemistry - physical chemistry of dispersed systems. Solutions of high-molecular compounds (IUD).	Apply modern methods of chemistry, physics, mathematics to solve problems that arise in the study of basic and major disciplines	Chemistry

Chemistry	Him 2248	BS	4.0	Физики и химии	2	2	School course: Chemistry	Materials in engineering design, Metal-working machines and welding equipment	Formation of students' system of fundamental knowledge of the basic laws of chemistry and physico-chemical methods of analysis with their subsequent application of professional activity and use for solving engineering problems. The study of the basic laws of chemistry, chemical reactions, the peculiarities of their course, control methods, the theory of the structure of organic compounds, the classification of reagents and reactions in organic chemistry.	Apply modern methods of chemistry, physics, mathematics to solve problems that arise in the study of basic and major disciplines	Physical and colloid chemistry
Automatic electric driver	AE 2238	BS	5.0	Exploitation electro-equipment	2	2	Electrical engineering and the basics of electronics, Mathematics, Physics	Calculation and design of food production machines, Installation, testing and operation of technological machines	Formation and development of competencies in the field of design and use of automated electric drive. Have the skills to calculate the parameters of an electric drive, analyze and select control schemes, determine optimal operating modes, introduce modern technologies into existing systems, carry out maintenance of electric drives, automate typical technological processes.	Make calculations in heat engineering, thermodynamics and electrical engineering; choose the correct operation of electrical and thermal equipment, analyze hazardous and harmful production factors, study the environment and life safety requirements	Electric machines and drives
Electric machines and drives	EMP 2250	BS	5.0	Exploitation electro-equipment	2	2	Electrical engineering and the basics of electronics, Mathematics, Physics	Calculation and design of food production machines, Installation, testing and operation of technological machines	Types of electromechanical energy converters; design features of electric drives; operating modes; methods of selecting electric motors; drive characteristics; operating modes of electric drives of basic agricultural machinery and equipment; physical fundamentals of electric drives; selection and calculation of mechanical characteristics and transients in electric drives.	Make calculations in heat engineering, thermodynamics and electrical engineering; choose the correct operation of electrical and thermal equipment, analyze hazardous and harmful production factors, study the environment and life safety requirements. To study the basic concepts of the laws of engineering mechanics, mechanics of materials, robotics and safety measures. To organize the production process, operation of MTP and maintenance of modern agricultural machinery with the introduction of innovative technologies and with the creation of business entities	Automatic electric driver
Pneumatic and hydraulic drives	PGP 3328	AS	4.0	Mechanization of technological processes	3	1	Basics of organization of wheeled and caterpillar machines, Mathematics, Measuring Systems, Physics	Agreecultural machines, Calculation and design of food production machines, Installation, testing and operation of technological machines, Metal-working machines and welding equipment	Possess the skills of calculating the basic parameters of vane and volumetric pumps, hydrodynamic gears, volumetric hydraulic and pneumatic drives used in transport and transport-technological machines; application of methods and means of measuring the characteristics of fluid and air flows. Study of technological equipment using hydraulic and pneumatic drives, classification of hydro-pneumatic machines and drives, features of hydraulic and pneumatic systems.	Make calculations in heat engineering, thermodynamics and electrical engineering; choose the correct operation of electrical and thermal equipment, analyze hazardous and harmful production factors, study the environment and life safety requirements	Mechanics of liquid and gas
Mechanics of liquid and gas	MZHG 3318	AS	4.0	Теплоэнергетика	3	1	Basics of organization of wheeled and caterpillar machines, Mathematics, Measuring Systems, Physics	Agreecultural machines, Calculation and design of food production machines, Installation, testing and operation of technological machines, Metal-working machines and welding equipment	Formation of a complex of fundamental knowledge in the field of fluid and gas mechanics related to the movement of the working medium. The study of the general laws of motion and equilibrium of liquid and gaseous media, the main models of liquid and gaseous media. Formation of the ability to solve practical problems of fluid and gas mechanics by basic mathematical methods.	To teach the basic concepts and laws of engineering mechanics, mechanics of materials, to prepare for the design and construction of typical machine elements	Pneumatic and hydraulic drives

Thermal and refrigerating equipment of food production	THOPP 3319	AS	3.0	Теплоэнергетика	3	1	Electrical engineering and the basics of electronics, Physics Mathematics, Physics	Calculation and design of food production machines, Technological processes and apparatus of food production	Equipment for heat and refrigeration. The role of heat transfer and mass transfer in technical processes. Thermal equipment in catering. Classification of methods of heat treatment in the OP. General principles of the device of thermal devices OP.	Make calculations in heat engineering, thermodynamics and electrical engineering; choose the correct operation of electrical and thermal equipment, analyze hazardous and harmful production factors, study the environment and life safety requirements	Thermal Engineering and Thermodynamics Basics
Thermal Engineering and Thermodynamics Basics	TOT 3327	AS	3.0	Теплоэнергетика	3	1	Electrical engineering and the basics of electronics, Mathematics, Physics	Calculation and design of food production machines, Cutting theory, cutting tools and tooling. Metal-working machines and welding equipment	Formation of knowledge of the laws of obtaining and converting energy, methods for analyzing the efficiency of the use of heat, the ability to experimentally determine the characteristics of thermal heat and power equipment; conversion, transfer and use of heat, to such an extent that they can select	Make calculations in heat engineering, thermodynamics and electrical engineering; choose the correct operation of electrical and thermal equipment, analyze hazardous and harmful production factors, study the environment and life safety requirements	Thermal and refrigerating equipment of food production
Machines and Apparatus for Processing Livestock Products	MAPPZh 3251	BS	5.0	Technological machines and equipment	3	1	Electric machines and drives, Electrical engineering and the basics of electronics, Fundamentals of technology processing industries, Materials in engineering design;	Installation, testing and operation of technological machines	Technological equipment for the preparation and processing of agricultural products by separation methods. Technological equipment for the preparation and processing of agricultural products by the methods of connection. Technological equipment for the preparation and processing of agricultural products by molding. Technological equipment for the preparation and processing of agricultural products by the methods of heat and mass transfer. Equipment for filling large-sized and small-sized containers, packaging machines, Line mechanized processing plants	To organize highly efficient operation of machines, apparatus, machinery and technological equipment in production, to show leadership qualities	Mechanization of cattle-breeding farm
Mechanization of cattle-breeding farm	MZH 3214	BS	5.0	Mechanization of technological processes	3	1	Electric machines and drives, Electrical engineering and the basics of electronics, Fundamentals of technology processing industries	Agreecultural machines, Installation, testing and operation of technological machines	Training students to knowledge, abilities and practical skills on technology and mechanization of production processes in animal husbandry. Modern progressive methods and techniques of mechanization of production processes in animal husbandry, selection of machinery and equipment for the production of livestock products, rational use of material and energy-saving technical means. Designing and completing units of production technological lines of livestock farms, complexes.	Choose the best options for setting up and adjusting, maintaining and repairing machine tools, manipulators, robots, welding equipment and technological machines. Diagnose and establish the causes of malfunctions, study materials science, the basics of the theory of wear of parts, repair technology, plan and carry out installation, testing and operation	Machines and Apparatus for Processing Livestock Products
Innovative entrepreneurship	IP 3125	GER	5.0	Economy	3	2	School courses Fundamentals of Law, Fundamentals of Entrepreneurship and Business	Mechanical and design assembly room, Production management	Form students' knowledge of the fundamental concepts of innovative development, modern approaches to the implementation of entrepreneurial activity in the field of new technologies to ensure the competitiveness of an innovative enterprise on the market. Understand the economic essence of innovative entrepreneurship, business planning, venture financing and know the types of firms with venture capital.	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of engineering, study innovative entrepreneurship and anti-corruption culture, formulate inventions	Basics of anti-corruption culture, Basics of economics and law, Introduction to leadership in education, Labor protection and basics of life safety

Introduction to leadership in education	VLO 3127	GER	5.0	Профессиональное образование	3	2	School courses: Fundamentals of Law; Fundamentals of Entrepreneurship and Business;	Production management	The discipline analyzes and studies the model of effective communication of the leader, methods of management in critical situations, methods of work in the management team and the principle of distribution of roles in the team, methods of effective control and motivation of training. It provides an opportunity to study the theory of leadership qualities and at the same time the concept of leadership behavior (three leadership styles (K. Levin), research at the University of Ohio, research at the University of Michigan, management system (R. Likert), management grid (Blake and Mouton), concept of reward and punishment, substitute leadership (S. Kerr and J. Germer)).	To organize highly efficient operation of machines, apparatus, machinery and technological equipment in production, to show leadership qualities	Basics of anti-corruption culture, Basics of economics and law, Innovative entrepreneurship, Labor protection and basics of life safety
Basics of anti-corruption culture	OAK 3126	GER	5.0	Economy	3	2	School courses Fundamentals of Law, Fundamentals of Entrepreneurship and Business	Production management	The course forms a system of knowledge on combating corruption, and the development on this basis of a civil position in relation to this phenomenon. As a result of mastering the discipline, students will be able to: navigate the legislation; analyze and apply legal acts in specific situations; follow moral	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of engineering; study innovative entrepreneurship and anti-corruption culture; formulate inventions	Basics of economics and law, Innovative entrepreneurship, Introduction to leadership in education, Labor protection and basics of life safety
Basics of economics and law	OEK 3124	GER	5.0	Economy	3	2	School courses Mathematics, Fundamentals of Law, Fundamentals of Entrepreneurship and Business	Mechanical and design assembly room, Production management	The discipline promotes knowledge of the subject of economic theory and methods of research, the basis of public production and forms of public economy, the mechanism of functioning of the market system, production, costs and income of the firm, national economy. To master the basics of the theory of the state and law, the basics of constitutional, administrative, civil, labor, family, criminal law.	Analyze in a logical and quantitative way the conditions for the development of production and evaluate the competitiveness of created products on the principles of engineering; study innovative entrepreneurship and anti-corruption culture; formulate inventions	Basics of anti-corruption culture, Innovative entrepreneurship, Introduction to leadership in education, Labor protection and basics of life safety
Labor protection and basics of life safety	OTOBZH 3118	GER	5.0	Mechanization of technological processes	3	2	Educational practice, Internship, School course: Fundamentals of life safety;	Internship, Pre-graduation practice, Production management	The discipline contributes to the formation of students' knowledge, practical skills to create safe and harmless living conditions, to prevent the causes and prevention of dangerous situations, to protect the population and production personnel and objects of the national economy from the possible consequences of emergency situations. Supervision and control of the implementation of legislation and responsibility for violation of labor protection requirements.	Make calculations in heat engineering, thermodynamics and electrical engineering; choose the correct operation of electrical and thermal equipment, analyze hazardous and harmful production factors; study the environment and life safety requirements	Basics of anti-corruption culture, Basics of economics and law, Innovative entrepreneurship, Introduction to leadership in education
Technology of agricultural engineering	TSM 3329	AS	5.0	Technological machines and equipment	3	2	Basics of design, Draft execution automation, Materials in engineering design, Mechanics of materials	Installation, testing and operation of technological machines; Production processes (CAM, DTSP)	To form general professional knowledge and skills in the field of design of technological processes; their equipment for the production of agricultural machinery and apparatus and their technical operation, to acquaint future graduates with the methods of technical calculations and the development of product designs in relation to progressive technologies for single, serial and mass production.	To organize highly efficient operation of machines, apparatus, machinery and technological equipment in production, to show leadership qualities	Technological processes and apparatus of food production

Technological processes and apparatus of food production	TPAPP 3320	AS	5.0	Technological machines and equipment	3	2	Fundamentals of technology processing industries, Materials in engineering design, Thermal and refrigerating equipment of food production	Calculation and design of food production machines, Mechanical and design assembly room, Production management	Formation of students' knowledge about technological processes and apparatuses of food production, as a set of scientific and engineering knowledge, which allows you to create new and improve existing technologies and equipment for food production. General patterns of technological processes; modeling of processes and devices; bases of rational construction of devices; grinding of solid materials; pressing, mixing, sorting processes; hydromechanical processes; membrane methods for separating liquid systems; essence of thermal processes; the main types of heat exchangers used in public catering; evaporation; condensation; theoretical foundations of mass transfer processes; sorption processes; drying; rectification; extraction; dissolution and crystallization	To organize highly efficient operation of machines, apparatus, machinery and technological equipment in production, to show leadership qualities	Technology of agricultural engineering
Machines and equipment for processing of crop products	MAPPR 3252	BS	5.0	Technological machines and equipment	3	2	Electric machines and drives, Fundamentals of technology processing industries, Pneumatic and hydraulic drives	Installation, testing and operation of technological machines	Machines, technologies, units, complexes of primary grain processing. Machines, Purpose, device, technology, equipment and complexes of primary processing of potatoes. Machines, technologies, equipment and complexes of primary processing of root crops. Machines, technologies, equipment and complexes of primary processing of fruits and vegetables	To organize highly efficient operation of machines, apparatus, machinery and technological equipment in production, to show leadership qualities	Agricultural machines
Agricultural machines	SM 3217	BS	5.0	Mechanization of technological processes	3	2	Basics of organization of wheeled and caterpillar machines, Electric machines and drives, Pneumatic and hydraulic drives	Installation, testing and operation of technological machines	Possession of knowledge on the device of agricultural machines and their adjustment to the specified working conditions, the basic principles and laws of interaction of the working bodies of machines with the processed material, skills in assessing the quality of technological operations, methods and means of quality control of agricultural machines, skills in using technical means for electrification and automation of technological processes.	To organize highly efficient operation of machines, apparatus, machinery and technological equipment in production, to show leadership qualities	Machines and equipment for processing of crop products
Calculation and design of food production machines	RPMP 4247	BS	5.0	Technological machines and equipment	4	2	Basics of design, Electric machines and drives, Fundamentals of technology processing industries, Materials in engineering design, Pneumatic and hydraulic drives, Technological processes and apparatus of food production		Concepts and definitions that characterize the principles, methods, techniques and rules of design and construction, as well as forming ideas about design objects, their properties and indicators, are generally accepted in engineering practice. The quality of the designed machine is evaluated by a number of theoretically justified quantitative indicators, the main of which are economic (machine utilization rate, profitability, economic effect, etc.) and design perfection (coefficients of unification, standardization, normalization levels, etc.). No less important are the principles and methods of designing machines that do not have a quantitative assessment: the formation of derivative machines based on the original model, the reduction of the nomenclature due to the rational choice of type and the inclusion of development reserves and other methods in the design.	To study the hardware and software of engineering and computer graphics and to establish the capabilities of computer-aided design of mechanisms and metalworking simulation	Mechanical and design assembly room

Mechanical and design assembly room	PMSC 4253	BS	5.0	Technological machines and equipment	4	2	Failure analysis and repair of machines, Installation, testing and operation of technological machines, Metal-working machines and welding equipment, Technology of agricultural engineering	Machines, technologies, units, complexes of primary grain processing, Machines, Purpose, device, technology, equipment and complexes of primary processing of potatoes, Machines, technologies, equipment and complexes of primary processing of root crops, Machines, technologies, equipment and complexes of primary processing of fruits and vegetables	To study the hardware and software of engineering and computer graphics and to establish the capabilities of computer-aided design of mechanisms and metalworking simulation	Calculation and design of food production machines
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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. Ussebayev

