

**NJSC "Kazakh National Research Technical University named after K.I. Satpayev"
Institute of Industrial Engineering
Department of "Machine-tool building, materials science and technology of
machine-building production"**

CURRICULUM PROGRAM

**"DIGITALIZATION OF ENGINEERING MANUFACTURING"
Master of Technical Sciences
in the field of mechanical engineering and digitalization of engineering
manufacturing**

on the basis of the following specialties of the invalidated Classifier of specialties: "6M071200-Mechanical engineering", "6M073800 - Technology of processing materials by pressure"

1st edition
in accordance with the State Educational Standard of Higher Education 2018

Almaty 2019

The program was drawn up and signed by the parties:

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от КазННТУ имени К.И. Сатпаева:

1. Заведующий кафедрой «Стандартизация, сертификация и технология машиностроения» (ССиТМ),

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Б.С. Арымбеков

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Е. Қожа

От работодателей - сопредседатель Консультативного совета ИПИ.

Ведущий специалист ТОО «Алматинский завод ЭлектроЩит» И.М. Дюсембаев

Approved at a meeting of the Educational and Methodological Council of the Kazakh National Research Technical University named after K.I. Satpayev. Protocol No. 3 dated 19.12.2018

Qualification:

Level 7 of the National Qualifications Framework:

7M071 Engineering and Engineering (Master of Science):

7M0712107 - Digitalization of engineering production

Professional competencies: in the field of research methodology; in the field of scientific and scientific-pedagogical activity in higher educational institutions; in matters of modern educational technologies; in the implementation of scientific projects and research in the professional field; in ways to ensure constant updating of knowledge, expanding professional skills and abilities.

Brief description of the program:

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1 Objectives of the educational program

The objectives of the EP " Digitalization of machine-building production " are:

Meeting the needs of students for intellectual, creative and professional development by acquiring knowledge and skills in the field of digitalization and mechanical engineering ;

Organization of master's training, allowing all graduates to continue their education, both with the aim of obtaining a PhD in digitalization and mechanical engineering , and with the aim of further self-improvement in order to successfully build a career in additive manufacturing.

Meeting the needs of the Republic of Kazakhstan for qualified personnel through training on the use and maintenance of digitization of engineering production facilities and professionals with the skills of design technology, computer-controlled due industrialization and digital- to -ization industry.

To ensure high quality training and competitiveness of graduates, the department pays great attention to integration and cooperation with employers and strategic partners.

2 Types of work

The types of professional activities for which graduates who have mastered the master's program are preparing:

- scientific research ;
- design and engineering;
- organizational and managerial;
- installation and commissioning;
- service and operational ;
- scientific and pedagogical .

The master's degree in the direction of training " Digitalization of engineering production " should be prepared for solving professional problems in accordance with the profile focus of the master's program and types of professional activities:

Scientific and Research Activities:

- implementation analysis and scientific and technical information, domestic and foreign experience in the field of research and development of digitalization and engineering production ; study of new methods of management theory, artificial intelligence technologies and other scientific areas that make up the theoretical basis for digitalization of engineering production , compilation and publication of reviews and abstracts;

- carrying out theoretical and experimental research in the field of developing new samples and improving existing digitalization and machine-building production , their modules and subsystems, searching for new additive technologies ;

- conducting patent research, accompanying the development of new digitalization and machine-building production, in order to protect intellectual property objects, the results of research and development;

- carrying out development and experimental samples of digitalization and machine-building production, their modules and subsystems in order to verify and substantiate the main theoretical and technical solutions to be included in the terms of reference for the performance of development work;

- organizing and conducting experiments on existing digitalization and machine-building production, their subsystems and individual modules in order to determine their effectiveness and determine ways to improve, processing the results of experimental research using modern information technologies;

- preparation of reports, scientific publications and reports at scientific conferences and seminars, participation in the implementation of research and development results into practice;

design and engineering activities:

- preparation of a feasibility study for projects of new digitalization and machine-building production, their individual subsystems and modules;

- calculation and research of digitalization and engineering production, control, information-sensor and executive subsystems using mathematical modeling methods, prototyping and testing of existing systems, processing of experimental data using modern information technologies;

- development of special software for solving problems of digitalization design and machine-building production, development of technical specifications and direct participation in the design of additive machines and equipment;

organizational and managerial activities:

- development of organizational and technical documentation (work schedules, instructions, plans, estimates) and established reporting according to approved forms;

- organization of the work of small groups of performers involved in research, design and construction work and in experimental research;

- control over the implementation of measures for the prevention of industrial injuries, occupational diseases, the prevention of environmental violations in the process of research and operation of digitalization and machine-building production;

installation and commissioning activities:

- participation in verification, commissioning, adjustment, assessment of the state of equipment and setting up digitalization and machine-building production for various purposes, including both hardware and software control systems;

- participation in the interface of hardware and software systems with technical objects as part of digitalization and machine-building production, in testing and putting into operation prototypes of such systems;

service and operational activities:

- participation in the verification, commissioning, adjustment and assessment of the state of digitalization and machine-building production for various purposes, as well as their individual subsystems, in setting up control hardware and software systems;

- preventive monitoring of the technical condition and functional diagnostics of digitalization and machine-building production for various purposes, as well as their individual subsystems;

- preparation of operating instructions for digitalization and machine-building production and their hardware and software, development of routine testing programs;

- preparation of applications for equipment and components, preparation of technical documentation for equipment repair ;

scientific and educational activities:

- participation in the development of programs of academic disciplines and courses based on the study of pedagogical, scientific, technical and scientific-methodical literature, as well as the results of their own professional activities;

- participation in the organization and modernization of individual laboratory works and workshops in professional disciplines;

- conducting training sessions with students, participating in the organization and management of their practical and research work;

- application and development of new educational technologies, including computer and distance learning systems.

3 Objects of professional activity

The objects of professional activity of a graduate are:

C ifrovizatsi I Mechanical engineering , including information and sensor, actuators and control modules, their mathematical, algorithmic and software, methods and means of their design, simulation, experimental study and design;

- theoretical and experimental studies of digitalization and engineering production for various purposes.

PASSPORT OF THE EDUCATIONAL PROGRAM

1 Scope and content of the program

The term of study in the master's program is determined by the amount of acquired academic credits. Upon mastering the established amount of academic credits and achieving the expected learning outcomes for obtaining a master's degree, the master's educational program is considered fully mastered. In the profile master's program, there are at least 62 academic credits with a term of study of 1.0 years.

The planning of the content of education, the method of organizing and conducting the educational process is carried out by the university and the scientific organization independently on the basis of credit technology of education.

MA in the profile direction is realized in an educational program of postgraduate education in the training of scientific and professional personnel for industry and research organizations, have in-depth scientific and practical and research training.

The content of the Master's degree program consists of:

- 1) theoretical training, including the study of cycles of basic and major disciplines;
- 2) practical training of undergraduates: various types of practices, scientific or professional internships;
- 3) research work, including the implementation of a master's thesis - for a scientific and pedagogical magistracy
- 4) final certification.

Content of subdivision "Digitalization of engineering production" in the framework of special s 6 M 071 200 - Machinery, 6 M 073 800 material handling - Technology pressure is implemented in accordance with the credit technology training and implemented at the state and Russian languages.

The EP allows you to successfully implement the principles of the Bologna Process. Based on the choice and independent planning of the sequence of study disciplines by undergraduates, they independently form their individual curriculum (IEP) for each semester according to the Working curriculum of the specialty and the Catalog of elective disciplines.

Objectives of the educational program:

- development of students through research activities, critical thinking, development of professionally oriented skills and abilities;
- the use of highly professional training of undergraduates in a different educational environment;
- training a new competitive generation of technical specialists for the labor market;

- developing an environment that supports people of different cultures, and creating an atmosphere of pursuit of knowledge, academic integration and intellectual motivation;
- Carrying out research work, educational activities based on the best world experience, the development of its own methods and style of training specialists;
- development of cooperation "university-industry" to meet the labor market requirements for technical specialists, to improve the quality of educational programs for training specialists;
- development of additional educational and training programs in the use of multimedia ynyh , new teaching technologies for training on the principle of learning throughout life;
- establishing partnerships with other universities, organizations in order to improve the quality of education, to support technical and cultural ties.

2 Requirements for applicants

The previous level of education of applicants is higher professional education (bachelor's degree). The applicant must have a diploma of the established sample and confirm the level of knowledge of the English language with a certificate or diplomas of the established sample.

The procedure for admitting citizens to the magistracy is established in accordance with the "Standard rules for admission to training in educational organizations that implement educational programs of postgraduate education.

Formation of a contingent master's degree, is carried out by district azmescheniya state educational order for training of scientific and pedagogical staff, as well as tuition fees at their own expense of citizens and other sources. The state provides citizens of the Republic of Kazakhstan with the right to receive, on a competitive basis, in accordance with the state educational order, free postgraduate education, if they receive education of this level for the first time.

At the "entrance", a master's student must have all the prerequisites necessary for mastering the corresponding educational master's program. The list of required prerequisites is determined by the higher education institution independently.

In the absence of the necessary prerequisites, the master student is allowed to master them on a paid basis.

3 Requirements for completing studies and obtaining a diploma

Awarded degree / qualifications : A graduate of this educational program is awarded an academic degree " Master of Engineering " in the direction .

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A graduate who has mastered master's programs must have the following general professional competencies:

- the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;
- the ability to independently formulate research goals, establish a sequence for solving professional problems;
- the ability to apply in practice the knowledge of fundamental and applied disciplines that determine the focus (profile) of the master's program;
- the ability to professionally choose and creatively use modern equipment for solving scientific and practical problems;
- the ability to critically analyze, represent, defend, discuss and disseminate the results of their professional activities;
- possession of the skills of compiling and preparing scientific and technical documentation, scientific reports, reviews, reports and articles;
- willingness to lead a team in the field of their professional activities, tolerantly perceiving social, ethnic, confessional and cultural differences;
- readiness for communication in oral and written forms in a foreign language to solve problems of professional activity.

A graduate who has mastered the master's program must have professional competencies corresponding to the types of professional activity that the master's program is focused on:

research activities:

- the ability to draw up mathematical models for digitalization of machine-building production, their subsystems, including executive, information-sensory and control modules, using the methods of formal logic;
- the ability to use existing software packages and, if necessary, develop new software necessary for information processing and control in the digitalization of machine-building production, as well as for their design;
- the ability to develop experimental layouts of control, information and executive modules digitalization of machine-building production and conduct their research using modern information technologies;
- the ability to analyze scientific and technical information, to generalize domestic and foreign experience in the field of digitalization of machine-building production, automation and control equipment, to conduct a patent search;
- the ability to develop methods for conducting experiments and conduct experiments on existing models and samples, digitalization of machine-building production and their subsystems, to process the results using modern information technologies and technical means;
- readiness to draw up analytical reviews and scientific and technical reports on the results of the work performed, in the preparation of publications based on the results of research and development;

- the ability to put into practice the results of research and development carried out individually and as part of a group of performers, to ensure the protection of intellectual property rights;

design and engineering activities:

- willingness to lead and participate in the preparation of a feasibility study for projects to create digitalization of machine-building production , their subsystems and individual modules;

- the ability to prepare technical specifications for the design of digitalization of machine-building production of their subsystems and individual devices using standard executive and control devices, automation equipment, measuring and computing equipment, as well as new devices and subsystems;

- the ability to participate in the development of design and project documentation, digitalization of machine-building production in accordance with existing standards and specifications;

- willingness to develop a methodology for conducting experimental research and testing digitalization of machine-building production , the ability to participate in such tests and processing of their results;

organizational and managerial activities:

- the ability to organize the work of small groups of performers;

- willingness to develop technical documentation (work schedules, instructions, plans, estimates) according to approved forms;

- willingness to apply methods of prevention of industrial injuries, occupational diseases, prevention of environmental violations;

installation and commissioning activities:

- the ability to carry out commissioning, adjustment and tuning of digitalization and engineering production for various purposes;

- willingness to debug hardware and software systems and their interface with technical objects as part of digitalization and machine-building production ;

- willingness to participate in testing and commissioning prototypes of digitalization and machine-building production ;

service and operational activities:

- readiness to participate in the development of routine test programs, verification and assessment of the state of digitalization and machine-building production for various purposes, as well as their individual subsystems;

- the ability to carry out preventive monitoring of the technical condition and functional diagnostics of digitalization and machine-building production for various purposes, as well as their individual subsystems;

- the ability to draw up instructions for the operation of digitalization and machine-building production and their hardware and software;

- readiness to draw up applications for equipment and components, to participate in the preparation of technical documentation for equipment repair.

scientific and educational activities:

- willingness to take a direct part in educational and educational-methodical work in the field of training, to participate in the development of programs of academic disciplines and courses;
- the ability to conduct training sessions, laboratory work, provide practical and research work of students;
- the ability to apply new educational technologies.

When developing a master's educational program , all general cultural and general professional competencies, as well as professional competencies related to the types of professional activities of specialists in robotics and mechatronics , are included .

4 Working curriculum of the educational program

4.1. The term of study is 1 year

Year of study	The code	Name of the discipline	Component	Loans		Lk/lb/pr	Prerequisites	The code	Name of the discipline	Component	Loans		Lk/lb/pr	Prerequisites
				ECTS	RK						ECTS	RK		
one	1 semester							2 semester						
		Foreign language (professional)	DB VK	5	3	0/0/3		Experimental research practice	NIRM	6				
		Project Management- (Management + Management Psychology)	DB VK	3	2	1/0/1		Internship	PP	ten				
	ISO	Industrial plant design	PD KV	4	2	1/0/1		Registration and defense of a master's thesis (OiZMD)	NIRM	12				
	ISO	Driving innovation in digital engineering	DB VK	5	3	2/0/1		Total:		28				
	ISO	Optimal machine design	PD OK	5	3	2/0/1		Total :		62				
	ISO	Management of advanced engineering technologies	PD KV	5	3	2/0/1								
	Experim	NIRM	7											

	ental research practice					
	Total:		34			

5 Descriptors of the level and amount of knowledge, abilities, skills and competencies

The requirements for the level of preparation of a master's student are determined on the basis of the Dublin descriptors of the second level of higher education (master's degree) and reflect the acquired competencies expressed in the achieved learning outcomes.

Learning outcomes are formulated both at the level of the entire educational program of the master's program, and at the level of individual modules or academic discipline.

Descriptors reflect learning outcomes that characterize the student's abilities:

1) demonstrate developing knowledge and understanding in the studied area of digitalization and mechanical engineering , based on the advanced knowledge of this area of digitalization and mechanical engineering in the development and application of ideas used in research x ;

2) apply at a professional level their knowledge, understanding and ability to solve problems in a new environment, in a wider interdisciplinary context;

3) collect and interpret information to form judgments, taking into account social, ethical and scientific inferences ;

4) clearly and unambiguously communicate information, ideas, conclusions, problems and solutions, both to specialists and non-specialists;

5) learning skills necessary for independent continuation of further education in the studied area of digitalization and mechanical engineering .

6 Competencies on completion of training

6.1 Requirements for key competencies of graduates of a *specialized master's program* , the master's student must:

1) *have an idea:*

- about the role of science and education in public life;
- about current trends in the development of scientific knowledge;
- on topical methodological and philosophical problems of natural (social, humanitarian, economic) sciences;
- about the professional competence of a higher school teacher;
- about the contradictions and social and economic consequences of globalization processes;

2) *know:*

- methodology of scientific knowledge;
- principles and structure of the organization of scientific activity;
- the psychology of students' cognitive activity in the learning process;
- psychological methods and means of increasing the efficiency and quality of education;

3) *be able to:*

- use the knowledge gained for the original development and application of ideas in the context of scientific research;
- critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena;
- integrate the knowledge gained in different disciplines to solve research problems in new unfamiliar conditions;
- by integrating knowledge, make judgments and make decisions based on incomplete or limited information;
- to apply the knowledge of pedagogy and psychology of higher education in their teaching activities;
- apply interactive teaching methods;
- to carry out information-analytical and information-bibliographic work with the involvement of modern information technologies;
- creative thinking and creative approach to solving new problems and situations;
- free to speak a foreign language at the professional level, allowing e m to carry out research and to implement the teaching of special disciplines in the universities;
- to summarize the results of research and analytical work in the form of a dissertation, scientific article, report, analytical note, etc .;

4) *have skills:*

- research activities, solving standard scientific problems;
- implementation of educational and pedagogical activities on credit technology of education;
- methods of teaching professional disciplines;
- the use of modern information technologies in the educational process;
- professional communication and intercultural communication;
- oratory , correct and logical formulation of their thoughts in oral and written form;
- expanding and deepening the knowledge necessary for daily professional activities and continuing education in doctoral studies.

5) *be competent:*

- in the field of research methodology;
- in the field of scientific and scientific-pedagogical activities in higher educational institutions;
- in matters of modern educational technologies;

- in the implementation of scientific projects and research in the professional field;
- in ways to ensure constant updating of knowledge, expansion of professional skills and abilities.

B - Basic knowledge, abilities and skills

B1 - know:

- English at a professional level;
- history and philosophy;
- methods of pedagogy and psychology;
- information devices and systems;
- with TERM and advanced materials processing technology
- Qualimetry in mechanical engineering

B2 - be able to:

- use the knowledge gained for the original development and application of ideas in the context of scientific research;
 - critically analyze existing concepts, theories and approaches to the analysis of processes and phenomena;
 - integrate the knowledge gained in different disciplines to solve research problems in new unfamiliar conditions;
 - by integrating knowledge, make judgments and make decisions based on incomplete or limited information;
 - to apply the knowledge of pedagogy and psychology of higher education in their teaching activities;
 - apply interactive teaching methods;
 - to carry out information-analytical and information-bibliographic work with the involvement of modern information technologies;
 - creative thinking and creative approach to solving new problems and situations;
 - be fluent in a foreign language, at a professional level that allows you to conduct scientific research and teach special disciplines in universities;
 - to summarize the results of research and analytical work in the form of a dissertation, scientific article, report, analytical note, etc .;
- B3 - have skills:**
- research activities, solving standard scientific problems;
 - implementation of educational and pedagogical activities on credit technology of education;
 - methods of teaching professional disciplines;
 - the use of modern information technologies in the educational process;
 - professional communication and intercultural communication;
 - oratory , correct and logical formulation of their thoughts in oral and written form;

- expanding and deepening the knowledge necessary for daily professional activities and continuing education in doctoral studies.

P - Professional competencies:

P1 - the ability to critically analyze and evaluate modern scientific achievements, generate new ideas when solving research and practical problems, including in interdisciplinary areas;

P2 - the ability to design and carry out complex research, including interdisciplinary, based on a holistic systemic scientific worldview using knowledge in the field of history and philosophy of science;

P3 - readiness to participate in the work of Kazakhstani and international research teams to solve scientific and scientific and educational problems;

P4 - readiness to use modern methods and technologies of scientific communication in the state and foreign languages;

P5 - the ability to follow ethical standards in professional activities;

P6 - the ability to plan and solve problems of their own professional and personal development.

O - Human, socio-ethical competences

O1 - Assess the surrounding reality on the basis of ideological positions formed by knowledge of the foundations of philosophy, which provide scientific understanding and study of the natural and social world by methods of scientific and philosophical knowledge;

O2 - Developing an environment that welcomes and supports people from different cultures, and creating an atmosphere of pursuit of knowledge, academic integration and intellectual motivation;

A3 - Have skills in social design and methods of forming and maintaining the socio-psychological climate in the organization.

C - Special and managerial competences

C1 - Independent management and control of the processes of labor and educational activities within the framework of the strategy, policy and goals of the organization, discussion of the problem, reasoning of conclusions and competent handling of information;

C2 - Organization of the activities of the production team, making organizational and managerial decisions in the context of different opinions and assessing the consequences of decisions made;

C3 - Organization in the division of work on the improvement, modernization, unification of the manufactured engineering production .

6.2 Requirements for the research work of a master student in a scientific and pedagogical magistracy:

- 1) corresponds to the profile of the master's educational program, according to which the master's thesis is performed and defended;
- 2) is relevant and contains scientific novelty and practical significance;
- 3) is based on modern theoretical, methodological and technological achievements of science and practice;
- 4) is carried out using modern scientific research methods;
- 5) contains research (methodological, practical) sections on the main protected provisions;
- 6) is based on advanced international experience in the relevant field of knowledge.

6.3 Requirements for the organization of practices:

The educational program of profile magistracy includes experimental and research practices in , who spends tsya in parallel with theoretical training or in a single period:

- 1) research in the PD cycle - at the place of the dissertation.

The research practice of the undergraduate is carried out with the aim of acquainting with the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of scientific research, processing and interpretation of experimental data.

7 ECTS Diploma Supplement

The application was developed according to the standards of the European Commission, Council of Europe and UNESCO / CEPES. This document is for academic recognition only and is not an official proof of education. Not valid without a university degree. The purpose of completing the European Supplement is to provide sufficient information about the holder of the diploma, the qualification obtained, the level of this qualification, the content of the study program, the results, the functional purpose of the qualification, as well as information about the national education system. The application model that will be used to translate grades uses the European Credit Transfer or Transfer System (ECTS).

The European Diploma Supplement provides an opportunity to continue education at foreign universities, as well as to confirm national higher education for foreign employers. When going abroad for professional recognition, additional legalization of the educational diploma is required. The European Diploma Supplement is completed in English upon individual request and is issued free of charge.

Foreign language (professional)

CODE - LNG205

CREDIT - 3 (0/0/3)

PREREQUISIT –Academic English, Business English, IELTS 5.0-5.5

PURPOSE AND OBJECTIVES OF THE COURSE

The aim of the course is to develop students' knowledge of the English language for their ongoing academic research and to improve their performance in the field of project management.

SHORT DESCRIPTION OF THE COURSE

The course is aimed at building vocabulary and grammar for effective communication in project management and improving reading, writing, listening and speaking skills at the "Intermediate" level. Students are expected to develop their Business English vocabulary and learn grammatical structures that are often used in a management context. The course consists of 6 modules. The 3rd module of the course ends with an intermediate test, and the 6th module is followed by a test at the end of the course. The course ends with a final exam. Master students also need to study independently (MIS). MIS is an independent work of undergraduates under the guidance of a teacher.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

Upon successful completion of the course, students are expected to be able to recognize the main message and message as well as specific details while listening to monologues, dialogues and group discussions in the context of business and management; understand written and spoken English in topics related to management; write management texts (reports, letters, emails, minutes of meetings) following a generally accepted structure

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with a higher degree of grammatical accuracy and using business words and phrases, speak about various business situations using appropriate business vocabulary and grammatical structures - in pairs and groups discussions, meetings and negotiations.

Project management

THE CODE

CREDIT 2

PRE - REQUISIT -

PURPOSE AND OBJECTIVES OF THE COURSE

Study of the basic principles of organization management and management of educational activities

SHORT DESCRIPTION OF THE COURSE

The content of the course is aimed at studying the basics of education management, Management of global educational processes, analysis and selection of strategic initiatives, a project as a strategy for managing the development of an educational institution / organization. Also, undergraduates will study marketing of education, human resource management in educational organizations, information and communication technologies in the field of education and management of the educational process (for example, higher education).

KNOWLEDGE , ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of studying this course, the master student should know:

- modern ideas about the role of pedagogical management in ensuring the competitiveness of an educational institution / organization;
- the content of the concept of "education management"; the main stages of the organization of the educational process;
- the main features of the marketing policy of an educational institution / organization;
- the main approaches used in the practice of human resource management of an educational institution / organization;

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- the role of information and communication technologies in education.
- be able to:
- to be guided by the main trends of modern scientific and technological development;
- use various resources and tools for managing the educational process;
- choose the most appropriate strategy for the innovative development of an educational institution / organization;
- work with scientific, technical and economic literature on the organization, management and marketing of education.

Psychology of management

THE CODE

CREDIT 2

PRE - REQUISIT -

PURPOSE AND OBJECTIVES OF THE COURSE

The goal is to familiarize students with modern ideas about the role and multidimensional content of the psychological component of management activities; increasing the psychological culture of the future master for the successful implementation of professional activities and self-improvement.

Tasks:

- Studying the theoretical and methodological foundations of management psychology - familiarity with various concepts, basic concepts, laws of management psychology .
- Study of the main socio-psychological problems of management and ways to solve them .
- Formation of students' mindset on the mandatory consideration of the psychology of the individual and the group in management.
- Familiarization with the methods of studying important social and psychological characteristics of the individual and the team, professional, interpersonal and intrapersonal problems by means of management psychology.
- Studying the basics of the psychology of the leader.

SHORT DESCRIPTION OF THE COURSE

The content of the course is aimed at the study by students of basic categories, basic concepts, directions, problems of general psychology and the possibility of their practical solution. The course "Psychology of Management" is of a practical nature and

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is aimed at determining the priority of the problems under study: psychology of the personality and activities of a leader, leadership, power and leadership, managerial communication, a group as an object of leadership, etc.

The study of the discipline, in addition to the theoretical and methodological part, has a pronounced practical focus and largely complements the courses in organizational psychology and social psychology.

Mastering the discipline ensures the formation and development of the ability of a future specialist to independently and reasonably design, as well as effectively apply the most appropriate psychological means for a specific situation to conduct a study of a person, activity and group in order to analyze their activities.

Optimal machine design

CODE - ISO

CREDIT - 2 (1/ 0 / 1)

PREREQUISIT –theory of mechanisms and machines, machine parts, resistance of materials .

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching " About ptimalno e design of machines " is the design of machines and mechanisms essential part of ency- alternating engineering. These are professional skills that take a long time to learn, creativity, courage of thinking, knowledge of working methods, etc. The course introduces the basic skills of design work - the choice of a machine diagram, its layout, design implementation , preparation of technical specifications, carrying out kinematic calculation, power calculations, the choice of design elements, drive .

SHORT DESCRIPTION OF THE COURSE

In the process of studying this course, knowledge and skills are given for carrying out design work to create working projects for which factories will be able to produce new original machines and mechanisms. At present, all attention for the training of designers in mechanical engineering is given to familiarization with the available computer programs for drawing and calculating machines. But the computer itself will not design a machine or mechanism. A machine is not designed by a computer and in the designer's head, and then he enters it into the computer's memory using computer graphics programs. This course teaches you how to create a new machine in a person's head. This is the statement of the problem, the choice of the necessary scheme, drive, interaction of machine elements with each other, structural elements - bearings, shafts, gear wheels, couplings, etc. The course examines the technological process of creating a

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new machine design, from a sketch design to working drawings of parts and an assembly drawing, etc.

KNOWLEDGE , ABILITY, SKILLS TO COMPLETE THE COURSE

The course provides an opportunity for masters to learn the methodology of designing machines and mechanisms, all stages of the design process, their content and significance are studied.

Skills and skills acquired during the course:

- the ability to use the knowledge gained from previous courses for real design work;
- practical skills in performing specific design work on the terms of reference for the design of equipment;
- the ability to perform a professional analysis of a working project;
- apply advanced design methods with obtaining high quality parameters of the machine .

Driving innovation in digital engineering

CODE - ISO

CREDIT - 3 (2/ 0 / 1)

PREREKVISIT - fundamentals of engineering production design, quality management system .

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the discipline "Implementation of innovations in digital engineering" is the formation of professional competencies in the field of modern digital technologies for designed machines at various stages of the life cycle of manufacturing mechanisms and machines, the study of new innovative technologies in mechanical engineering.

SHORT DESCRIPTION OF THE COURSE

Digital manufacturing is a concept of technological preparation of production in a single virtual environment using tools for planning, checking and simulating production processes. In the course of studying the discipline, concepts are given about: - management of the preparation of the production of a product in digital technologies; innovative technologies of engineering industries; the calculation, modeling and design of computer-controlled equipment are considered; informational and scientometric support of research, the study of a complex of machine tools and control and measuring equipment with CNC, various processing centers, promising materials in mechanical engineering, issues of innovative management in mechanical engineering, CAD of technological machines and equipment are studied.

KNOWLEDGE , ABILITY, SKILLS TO COMPLETE THE COURSE

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As a result of studying the discipline, the student must have the following competencies: the ability to scientifically evaluate new solutions in the field of construction and modeling of machines, drives, equipment, technological systems and specialized machine-building equipment, as well as means of technological equipment for production; the ability to formulate and solve atypical problems of a mathematical, physical, design, technological, electrotechnical nature in the design, manufacture and operation of new equipment; willingness to carry out expert reviews of proposed design solutions and new technological solutions; the ability to apply methods of analysis of options for technical solutions in mechanical engineering, development and search for optimal solutions; the ability to develop and implement effective technologies for the manufacture of mechanical engineering products, participate in the modernization and automation of existing and design new engineering industries for various purposes, funds

Industrial plant design

CODE - ISO

CREDIT - 3 (2/0/1)

PREREQUISIT - Fundamentals of engineering technology, technology for the production of machines.

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the discipline "Designing an industrial enterprise" is the acquisition of theoretical and practical knowledge by undergraduates in the planning of production and service areas, as well as in the design of a machine-building enterprise.

SHORT DESCRIPTION OF THE COURSE

During this course, issues are considered that will allow future specialists - undergraduates to have information about the basics of mechanical engineering technology, the basic requirements for the plant and the structure of a modern engineering enterprise (classification, workshops and services): metal-cutting machines; process design; determination of the complexity of machining; the layout of the machine shop and the basic principles of the arrangement of equipment; basic provisions for the organization of the workplace and the requirements for them.

KNOWLEDGE, ABILITY, SKILLS TO COMPLETE THE COURSE

As a result of mastering the discipline, the master student must know:

- the concept of an engineering plant;
- classification of industrial enterprises;
- types of production;

- the main forms of specialization of enterprises and workshops;
- classification of standards for work rationing;
- basic rules and regulations in the design of enterprises.

Should be able to:

- to identify the types of specialization of the workshops of the enterprise;
- calculate the duration of the production cycle;
- determine the number of places and design characteristics of conveyors used in continuous production;
- calculate the labor intensity of work;
- to calculate the calendar and planning standards of the enterprise;
- build schedules for scheduled preventive maintenance;
- determine the wages of the main workers;
- to develop a technological layout of optical, mechanical or assembly shops.
- on the rationing of labor of engineers and employees.

Management of advanced engineering technologies

CODE - ISO

CREDIT - 3 (2/0/1)

PREREQUISIT - quality management system, quality management

PURPOSE AND OBJECTIVES OF THE COURSE

Course The purpose of discipline is to teach a student the basic principles of innovation management. The undergraduate must know and understand what innovative management is, the stages of its implementation, the necessary skills to carry out these stages, etc.

Objectives of the course study:

- the main tasks of innovation management,
- the main principles of innovation management,
- the main problems of achieving innovative development,
- the main achievements of the scientific theory of innovative development.

SHORT DESCRIPTION OF THE COURSE

As a result of studying the discipline, students will become familiar with the following concepts, such as:

- Innovation management - elementary cycle The concept of innovation management and innovation. Stages of the innovation cycle, risks of not completing the stages;

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- State support for innovative development. The role of the state in the development of innovations. Development institutions, Legislative acts in the field of innovation. The Law “On State Support for Industrial and Innovative Activity. " On Science";
- State innovation policy . the impact of innovation on the development of industry and society ;
- The role of skills in innovative development. Science in the modern world. Scientific activities . methodology of scientific work. Scientific laws ;
- Innovative business. Economic strategies for promoting innovation. Classification of innovation in business ;
- Tasks of a higher educational institution in innovative development . the main directions of work of a modern university. The value of the textbook in innovative development.

KNOWLEDGE , ABILITY, SKILLS TO COMPLETE THE COURSE

The student **must know** the tasks of innovation management , the principles of innovation management , the principles of innovation management , the main achievements of the scientific theory of innovative development.

Master's thesis defense

CODE - ECA501

CREDIT –7

The purpose of the master's thesis is:

demonstration of the level of scientific / research qualifications of a master student, the ability to independently conduct scientific research, test the ability to solve specific scientific and practical problems, knowledge of the most general methods and techniques for their solution.

SHORT DESCRIPTION

A master's thesis is a final qualifying scientific work, which is a generalization of the results of an independent study by a master student of one of the urgent problems of a specific specialty of the corresponding branch of science, which has internal unity and reflects the course and results of the development of the chosen topic.

Master's thesis is the result of the research / experimental research work of the master's student, carried out during the entire period of study of the master's student.

The defense of a master's thesis is the final stage of the master's preparation. A master's thesis must meet the following requirements:

- research should be carried out in the work or actual problems in the field of robotics and mechatronics should be solved ;

- the work should be based on the definition of important scientific problems and their solution;
- decisions must be scientifically grounded and reliable, have internal unity;
- the thesis should be written individually.

Content

- 1 Scope and content of the program
- 2 Requirements for applicants
- 3 Requirements for graduation and diploma
- 4 Working curriculum of the educational program
- 5 Descriptors of the level and amount of knowledge, abilities, skills and competencies
- 6 Competencies on completion of training
- 7 ECTS Diploma Supplement