

ADDITIONAL (MINOR) EDUCATION PROGRAM " SMART SYSTEMS ENGINEERING»

PROGRAM DESCRIPTION

It consists in the concept of organizing the educational process based on the choice of individual educational trajectories by students based on the educational program. In the OP being implemented the minor "Engineering Smart systems." Education is aimed at the formation of professional competencies, which are expressed in the development of students' scientific and technical views, the disclosure of internal resources of the individual.

The educational process is organized in the form of lectures, seminars, and practical classes.

Smart systems engineering the continuing education program is an elective course within this academic program. Know the graphic concepts of three-dimensional objects and mechanisms using the basic methods of computer graphics, General methods of building and reading drawings, the basic requirements of a normative and technical document for creating three-dimensional models of mechanisms and sets, the rules governing processing in drawings and other design documents; modern information and automated technologies for automatic design; the basics of standardization; connection between the design and technological stages of manufacturing a production product.

Spatial transformation of three-dimensional objects of geometric objects and systems in the projection plane, development of standard design documents, production of parts of drawings and Assembly units using automatic design systems.

Have skills in planning and organizing work on the development of a system of design documentation in modern design systems; form visual representations of the type of mechanism according to the drawing, skills in performing standard operations in the interface of a computer-aided design system.

The number of credits for obtaining a bachelor's degree remains unchanged-240 credits.

Students must earn 15 credits. Each course consists of 5 credits.

LEARNING OUTCOMES:

upon completion of this program, students will be able to:

Ability to manage the natural-scientific significance of problems in professional activity, to use the appropriate physical and mathematical apparatus to solve them;

Ability to apply computer skills, master the methods of information technology, meet the basic requirements of information security;

Mastering the physical principles of functioning of various sensors and detectors;

Training of circuit diagrams of detectors used in industry;

Conducting laboratory classes for the practical development of the physical principles of measuring devices.

Possesses constructive and geometric thinking, the development of concepts and sensations of space, the ability to analyze and generalize the plane and spatial type and relationships.

ADVANTAGES OF THIS PROGRAM

In addition, the ability to recognize relationships as conditions for successful professional and social activities to continuing education through the minor;

The ability to understand and behave tolerantly in a multicultural world, the ability to be ready for dialogue with other people, the ability to reach mutual understanding, find common goals and cooperate to achieve them;

Ability to understand the system of knowledge about fundamental laws and theories, physical values of phenomena and processes in nature and technology;

The possibility of using modern software for processing various types of graphic information and carrying out project activities using modern information and communication technologies;

Ability to present a clear calculation using information and communication technologies and a way to solve the natural science cycle;
 Formation of General competencies, such as the ability to generalize the results of physical research to describe phenomena and processes in the environment.
 The student must receive 15 credits. Each course consists of 5 credits.

REQUIREMENTS FOR ENROLLMENT:

- The program is available to all students of kazakh National Women's Teacher Training University;
- An introductory course will be provided for first-year students;
- Students are required to choose at least two courses from the list of required subjects;
- Students will be required to select at least three courses from the list of elective subjects;
- Master's students can also choose this program, however, none of these courses will be counted as part of their academic program.

The program of additional education "smart systems Engineering" does not require prerequisites.

PROGRAMME CONTENT

Name of discipline	AK. credits of the discipline	Language
Theory of electrical circuits	5	Kazakh /Russian
Fundamentals of microelectronics	5	Kazakh /Russian
Physics of sensors and sensors	5	Kazakh /Russian

The name of the course: Theory of electrical circuits

Number of credits: 5

Short description of the discipline: The subject of the course of circuit theory is the study of both qualitative and quantitative aspects of electromagnetic processes occurring in electrical circuits. This course consists of three parts: Steady-state processes in linear electrical circuits. Steady-state processes in nonlinear electrical circuits. Transients in electrical circuits.

The content of the discipline includes: Frequency characteristics of an electrical circuit. Linear electric circuits in the mode of periodic inharmonic effects. Transients in linear electrical circuits. Classical method of analysis. An operator method for analyzing transients in linear circuits. A time-based method for analyzing transients in linear electrical circuits. Frequency method of analysis of transient processes in linear circuits. Nonlinear electrical circuit in the constant current mode. Non-linear electric circuits with harmonic actions. Fundamentals of the four-pole theory. Chains with distributed parameters. Circuit with feedback. Self-oscillating circuits. The problem of synthesis of linear electrical circuits. Filter chains and their synthesis. Corrective chains and their synthesis. Discrete circuits and signals.

The name of the course: Fundamentals of microelectronics

Number of credits: 5

Short description of the discipline: Providing electrical engineering training of students at the level of understanding the physical processes and functional properties of devices when receiving,

converting and transmitting information in the form of electrical signals, as well as analyzing the capabilities of basic electrical and electronic devices when choosing tools for hardware and software complexes of information systems is an important part of the "physics of smart systems" minor of this educational program.

The content of the discipline includes: Basic principles and concepts of microelectronics. Basic terms and definitions. Integrated circuits (ICS) and their classification. IMS series. The system of IC designations. Active elements of integrated circuits. Methods for isolating elements. The integrated transistors. Integrated diodes. Special-purpose transistor structures. Elements of semiconductor permanent storage devices (ROMs). MNOP-transistor. A TIR transistor with a floating gate. Two-gate TIR transistor. Charge-coupled devices. Passive elements of integrated circuits. Integrated resistors. Integrated capacitors and inductors. Switching connections. Current trends in the development of microelectronics. Moore's law as a basis for evaluating the rate of development of microelectronic technologies.

The name of the course: Physics of sensors and sensors

Number of credits: 5

Short description of the discipline: Study of the physical principles of functioning of various types of sensors and detectors 2) study of the schematic diagrams and technical implementation of detectors used in the industry 3)conducting laboratory classes for the purpose of practical study of the physical principles of measuring devices.

The content of the discipline includes: Basic parameters, characteristics, and principles of operation of Microsystem sensors. Amplitude, phase, frequency and time pulse sensors. Microsystem sensors of physical quantities. Strain-resistant sensors. Semiconductor sensors. Interfaces of Microsystem sensors and sensor systems. Optimization of the characteristics of integrated sensors and sensor systems. Reliability of elements and components of sensor systems.