APPROVED

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«_30_» _____ 2024 y.

Program

«ICT development of the university 2035»

Semey 2024

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Introduction

The program aims to automate and optimize administrative and educational processes through ICT integration. Key objectives include implementing Learning Management Systems (LMS), Enterprise Resource Planning (ERP) systems, digital platforms for students and staff, and data-driven decision-making tools. The program enhances communication, supports distance learning, provides digital skills training for staff, and increases transparency in management processes. These measures are expected to reduce the time and resources required for routine tasks, improve the quality of educational services, and simplify resource management within the university.

Deadline**:** January 1, 2035

Goal

The program's goal is to implement ICT to enhance university management efficiency, streamline administrative and educational processes, improve interactions among students, faculty, and administration, and strengthen transparency in decision-making. The program aims to create a digital environment that supports higher quality educational services, more efficient resource use, and the sustainable development of the university.

Paragraph 1. Energy sources

Tasks:

1. Optimization of energy use in the university infrastructure using ICT.

2. Implementation of systems for monitoring, management and analysis of energy consumption.

3. Development of renewable energy sources and reduction of the carbon footprint.

4. Engaging students and staff in sustainable practices related to energy and environmental protection.

Ways to complete tasks:

Title	Description
Intelligent Energy Management Systems (Smart Grid)	Installation of solar panels on university buildings and the introduction of wind turbines
	The use of renewable energy management systems with ICT support for optimal integration into the common energy grid.
Smart Buildings	Integration of energy storage systems to manage excess energy produced by renewable sources (batteries and other storage devices) into an energy management system.
	Implementation of intelligent Building Management Systems (BMS) for automation of energy consumption control, including heating, ventilation, air conditioning and lighting.
	Integration of systems with motion sensors and natural lighting for optimal use of resources.
Digital platforms for carbon footprint monitoring	The use of energy-efficient materials, LED lighting, as well as insulation and cooling technologies to reduce energy consumption.
	Creation of a digital platform for monitoring and analyzing the carbon footprint of the university, tracking carbon dioxide emissions from energy consumption, transport, waste and other sources.
Using AI and Big data for energy efficiency	Develop a strategy to reduce carbon emissions using data-based projections.
	Using big data and machine learning algorithms to analyze energy consumption, identify inefficient processes, and predict energy needs.
	Optimization of heating, ventilation and air conditioning systems based on data on climatic conditions and user activity.
Community awareness and participation	Implementation of AI systems for modeling various scenarios of climate change and their impact on the energy needs of the university.

	Development of mobile applications to inform students and staff about current energy consumption, carbon footprint and energy saving tips.

Results:

• Reduction of total energy consumption through digitalization and improved control over resource consumption.

• Reducing carbon dioxide emissions and the carbon footprint of the university.

• Improving the energy efficiency of university buildings and infrastructure.

• Engaging students and staff in environmentally sustainable practices and technologies.

Paragraph 2. Waste management

Tasks:

1. Optimization of the waste collection, sorting and recycling process using ICT.

2. Reducing the total amount of waste sent to landfills by increasing the proportion of recycled materials.

3. Involving students and staff in waste management processes through the use of digital tools.

4. Automation of monitoring and reporting on waste management.

Ways to complete tasks:

Title	Description
Intelligent waste sorting containers	Installation of smart waste sorting containers equipped with sensors that monitor the level of occupancy, type of waste and warn of the need to empty them.
	Equipping containers with cameras and a recognition system to give users advice on proper sorting through a mobile application.
Digital Waste management platform	Integration of Smart containers into a single waste management system that helps to track waste volumes and their distribution by category (plastic, paper, organic waste, etc.).
	Equipping the system with the ability to notify maintenance personnel of the need to remove waste, which helps optimize logistics.
	The introduction of a digital platform for tracking all data related to waste management: the volume of waste generated, the percentage of recycling, the amount of resources used.
Implementation of a reward system for the proper disposal of waste	Using analytical tools and reports to identify sources of excess waste and create a strategy to reduce it.
	The platform can automatically generate reports for internal and external reporting, including information on the carbon footprint and compliance with waste recycling regulations.
Optimization of waste disposal logistics	Creating a mobile application for students and staff that informs them about the location of the nearest sorting containers, their occupancy level and provides tips on proper waste disposal.
	The application can encourage participation in environmental initiatives by providing bonuses and rewards for proper waste sorting, participation in campaigns for the collection of recyclable materials and other environmental initiatives.
Development of waste	Within the framework of the mobile application, the introduction of a system of accumulation of "ecopoints", which users receive for active participation in recycling and

recycling infrastructure	proper sorting of waste, with the further possibility of exchanging various bonuses: discounts, participation in events and other benefits.
	Integration of data from smart containers into a system that plans routes to optimize waste disposal logistics.
	The use of AI to predict the need for waste disposal based on data on container occupancy and previous data on generated volumes.
Environmental education and awareness-raising	Organization of recycling stations for basic types of waste (paper, plastic, glass, organic waste) directly on the university grounds.
	Implementation of sorting quality control systems.
	Installation of composting stations for processing organic waste from university canteens and cafes.
Monitoring and disposal of hazardous waste	Using digital panels, screens and applications to raise awareness among students and staff about the importance of waste sorting and recycling, as well as the results of the program.

Results:

• Reducing the amount of waste sent to landfills and increasing the proportion of recycled materials.

• Reducing waste collection and disposal costs by optimizing logistics.

• Raising environmental awareness among students and university staff.

• Automation of the waste management process using digital technologies.

• Engaging the university community in sustainable recycling and waste reduction practices.

Paragraph 3. Water resources management

Tasks:

1. Optimization of water consumption at the university using ICT.

2. Improving the efficiency of water supply and sanitation systems.

3. Reducing water losses through digital monitoring and process automation.

4. Education and involvement of students and staff in the rational use of water.

Ways to complete tasks:

Title	Description
Intelligent water meters and sensors	The introduction of smart water meters with sensors that monitor water consumption in real time at various university facilities (dormitories, academic buildings, sports facilities).
	Automation of water meters to transfer data to a central system for analysis and identification of potential leaks or excessive consumption.
Early warning and leak detection systems	Development of a water supply management system with the function of automatically shutting off the water supply when leaks or abnormal consumption are detected.
	Implementation of a sensor system that detects leaks in water supply systems and reports them in real time.
Optimization of wastewater and water treatment systems	Using AI and machine learning algorithms to analyze data and predict leak risks based on previous data.
	The introduction of digital technologies for the management of wastewater disposal and wastewater treatment systems.
	The use of digital technologies to optimize the operation of wastewater treatment plants and reduce water treatment costs.
Smart Rainwater management Systems	Implementation of a real-time water quality monitoring system at key points of water supply and sanitation to prevent pollution and improve water treatment.
	Implementation of smart rainwater collection and storage systems with the possibility of using it for irrigation of green areas, technical needs and other secondary purposes.
	Integration with weather forecasts to manage the volume of water storage and prevent its loss in case of overflow of reservoirs.
Water economy systems in the university infrastructure	The use of sensors to monitor and control drainage systems on the university grounds in order to prevent flooding and optimize the operation of the rainwater collection system.

	Installation of sensor faucets and shower systems that automatically regulate the water supply, reducing its consumption.
Mobile applications for tracking water consumption	Smart irrigation systems for green spaces that automatically regulate watering based on weather conditions, soil moisture and plant demand data, thereby reducing unnecessary water use.
Environmental education and awareness-raising	Creating a mobile application for students and staff that shows data on current water consumption, comparison with previous periods and tips on water economy.
	Conducting information campaigns for students and staff on the rational use of water, ways to save it and the importance of protecting water resources.
	Organization of seminars, webinars and courses on sustainable water resources management with an emphasis on the use of ICT.
	Placement of interactive screens at the university, which show real-time data on water consumption in different buildings of the university, the level of rainwater in reservoirs and the cumulative water savings achieved by the efforts of students and staff.
Data analysis and strategy adaptation	Using big data and analytics to optimize water supply and sanitation based on the needs of different areas of the university. This avoids excessive water use and improves planning.
	The use of AI to predict future water needs based on data on weather conditions, precipitation levels and consumption of past periods.

Results:

• Reduce water consumption and prevent leaks through digital monitoring and automation.

• Reducing water losses and improving the efficiency of water supply and sanitation systems.

• Improving environmental literacy among university students and staff.

• Reducing the cost of water consumption and purification.

• Increased reuse of rainwater and other water resources.

Paragraph 4. Infrastructure

Tasks:

1. Development of the university's digital infrastructure to ensure effective access to ICT.

2. Automation of key processes related to training, research and administrative work.

3. Improving the interaction between teachers, students and administrative structures using modern technologies.

4. Improving the digital literacy of all participants in the educational process.

Ways to complete tasks:

Title	Description
Cloud technology Infrastructure	Implementation of cloud solutions for data storage (exam results, research papers, administrative documents).
Cloud services for training and management	Using cloud technologies to organize distance learning (learning management systems such as Moodle, Blackboard or Google Classroom). Implementation of digital laboratories and virtual simulators for disciplines requiring practical skills.
Information systems for university management	Implementation of ERP systems for the management of curricula, schedules, finances and human resources.
Digital University Management System	Automation of student enrollment processes, academic performance management, certifications and graduation procedures.
	Development of a system of electronic journals, statements, a system for checking and evaluating knowledge.
Development of network infrastructure and security	Personal accounts of students and teachers for access to educational materials, schedules, exam results and other data.
	Ensuring stable high-speed Internet connection throughout the university (including dormitories).
	Creation of secure Wi-Fi networks for employees and students with access control.
	Continued implementation of the information security policy.
The use of artificial intelligence (AI) and data analysis	Implementation of monitoring and protection systems against cyber threats, access control to information resources.
	Implementation of big data analysis systems to predict student academic performance, identify problem areas and optimize learning processes.
Support for research	Using AI to automatically check homework, create individual learning paths for students.

activities	Implementation of digital platforms for collaboration between scientists (data repositories, project management systems).
Mobile applications and information availability	Creating a platform for applying for grants, tracking their status and managing project financing.
	Development of universal mobile applications for access to the schedule, electronic library, educational materials, academic performance and other services.
	Development of electronic libraries with access to textbooks, teaching aids and other materials.
Professional development and digital literacy programs	Creation of portals with open educational resources, video lectures and training courses.

Results:

• Improving the quality of the educational process through the use of digital technologies.

• Improving students' and teachers' access to educational resources.

• Optimization of university management processes.

• Improving the level of information security.

Paragraph 5. Transport

Tasks:

1. Optimization of transport flows using ICT.

2. Reducing the negative impact of transport on the environment (reducing CO2 emissions).

3. Improving the comfort and safety of transport movements for all participants in the university process.

4. Reducing dependence on personal cars in favor of public transport and sustainable modes of transportation (bicycles, electric scooters).

Ways to complete tasks:

Title	Description
Intelligent Transport System (ITS)	Implementation of an intelligent transport management system that monitors and regulates traffic flows in real time on the university grounds using sensors and video cameras.
	Implementation of a parking space management system that monitors available spaces in real time and informs drivers through a mobile application and digital scoreboards.
	Implementation of a parking reservation system for students, staff and guests of the university.
Mobile applications for transport management	Creating a mobile application that provides information about the available ways to get to the desired building: public transport schedules, availability of bicycles and electric scooters, free parking spaces.
Infrastructure for sustainable modes of transport	Installation of charging stations for electric cars and electric scooters on the territory of the university.
	Development of infrastructure for cyclists.
The program of rewards for sustainable movement	The introduction of a program in which students and staff receive "eco points" for using public transport, bicycles or electric scooters, with the further possibility of exchanging various bonuses: discounts, participation in events and other benefits.
	Conducting competitions and events aimed at encouraging students to develop new transport solutions using ICT to reduce the burden on transport infrastructure and reduce CO2 emissions.
Digital management of logistics and transport of the University	The use of ICT to manage logistics of university transport (transportation of goods, staff movement). The system analyzes traffic congestion, the current state of transport and routes to suggest the best ways.
	Implementation of the monitoring system of the university's

	official transport in order to optimize its use and reduce inefficient trips.
Education and awareness raising	Conducting educational events, seminars and webinars for students and staff to raise awareness about environmentally sustainable ways of traveling and the importance of reducing the use of personal cars.
	Creating information materials that show the impact of transport on the environment and offer alternatives to reduce harmful emissions.
	Posting data on traffic congestion, parking availability and environmental initiatives on digital panels at the university, as well as in mobile applications.
Data analysis and strategy adaptation	The use of ICT to collect and analyze data on traffic flows, the needs of students and staff in movements and the efficiency of public transport.
	Regular review of the university's transport strategy based on data analysis. The introduction of new technologies and solutions as transportation technologies evolve and user needs change.

Results:

• Reduction of traffic congestion and parking on the university grounds.

• An increase in the use of public transport, bicycles and electric vehicles.

• Reducing carbon dioxide emissions and improving the environmental situation at the university.

• Improving the comfort and convenience of transportation for students and staff.

• Creation of a smart transportation system that improves the quality of life and contributes to the sustainable development of the university.

Paragraph 6. University management

Tasks:

1. Automation and integration of university management processes.

2. Optimization of the work of administrative services and the educational process.

3. Ensuring more effective communication between students, teachers and administration.

4. Facilitating decision-making based on data and analytics.

Ways to complete tasks:

Title	Description
Learning Management System (LMS)	The introduction of modern LMS to manage training courses, automate learning processes, provide students with access to educational materials and support online learning.
	Students can enroll in courses through the system, receive study materials, submit papers and take tests, and teachers can manage courses, evaluate students and keep records.
	Enabling the function of notifying students about upcoming classes, schedule changes and events.
	The system can automate the process of scheduling, take into account the employment of audiences, as well as keep electronic journals of academic performance and attendance.
Integrated Resource Management System (ERP system)	Implementation of an ERP system for automation of accounting, financial management, personnel and university resources.
	Optimization of recruitment processes, work with scholarships, budget planning and procurement.
	The inventory and material resources management system allows you to track equipment, training materials and other resources. This will improve the control over the use of property and optimize the procurement process.
	The introduction of an electronic document management system for storing and processing all administrative and educational documents in digital form, which will simplify access to the necessary materials and reduce the time for their processing.
A digital platform for students and staff	Creating a digital personal account of the student, where all the main functions will be collected: registration for courses, access to educational materials, schedule, exam results, scholarships and information about debts.
	Implementation of the student feedback function, where they can submit inquiries for references, apply for study programs and scholarships, and participate in surveys.

	The teacher's personal account will allow you to manage training courses, check and evaluate students' work, conduct online consultations, plan a schedule and track individual student progress.
Communication management system	Implementation of a unified communication platform (including corporate mail, messengers, forums and web conferences) for employees and students.
	Implementation of a real-time notification system via a mobile app or email to inform students and staff about important events, schedule changes, availability of new resources and other relevant issues.
	Implementation of analytical systems to collect and analyze data on all aspects of the university's activities: from student attendance and academic performance to financial indicators and resource use.
Analytical tools for decision-making	Creation of mobile applications for students and university staff, allowing them to manage the educational process, access educational materials and schedules, as well as participate in online events and consultations via smartphone.
Support for mobility and remote access	Implementation of distance learning solutions such as video conferencing, online courses and virtual classrooms that allow students and teachers to participate in the educational process remotely.
Mobile applications for students and staff	Organization of regular courses for teachers and staff on the use of new ICT solutions, data management, distance learning and other important digital tools.
	Development of a long-term strategy for digitalization of all processes at the university and the organization of working groups for the implementation of ICT at all levels.
Professional development and employee training programs	Implementation of a system for collecting feedback from students and staff through digital platforms.

Results:

- Simplification and automation of administrative and educational processes, which will reduce time and resources for their implementation.
- Increasing the transparency of management and improving the interaction between students, teachers and administration.
- Reducing the burden on teachers and staff by automating routine tasks.
- Improving the quality and accessibility of educational services through the use of digital platforms.
- Informed decision-making based on data and analytics, which will allow for more efficient management of university resources.