

## Educational Laboratory “Laboratory of Automated Systems in the Electric Power Industry”.



**Purpose:** The purpose of the laboratory is to develop students’ practical skills in the design, configuration, programming, and operation of automated control systems in the electric power industry through the study and hands-on use of training stands for Automated Commercial Electricity Metering Systems (ACEMS), SCADA systems, and telemechanics systems. The laboratory is designed to teach the principles of data acquisition, transmission, processing, and visualization, as well as remote monitoring and control of technological processes in electrical networks and substations using specialized SCADA software. It also aims to train specialists capable of applying modern digital technologies in the operation and automation of electric power facilities.

**Objectives of the Laboratory:** To provide students with comprehensive knowledge of Automated Commercial Electricity Metering Systems (ACEMS), explain their operating principles, and develop practical skills in monitoring, metering, and calculating electricity consumption in multi-apartment residential buildings and private households. To study and gain hands-on experience with the principles of telemechanics, including telesignaling, telemeasurement, and remote control. To develop skills in transmitting operational information to dispatchers, converting analog signals into digital values using analog-to-digital converters (ADCs), displaying and analyzing acquired data at dispatch centers using SCADA systems, plotting monitored parameters, identifying emergency situations, and receiving corresponding alarm signals.

**Consumers / Partner Organizations:** Almaty, JSC “Alatau Zharyk Company”; LLP “NOVA VISION”; NERO GROUP (Nero Lab / Nero).

**Laboratory Uniqueness:** The uniqueness of the Automated Systems in the

Electric Power Industry laboratory lies in the integration of ACEMS, SCADA, and telemechanics training stands into a unified educational and practical environment that enables students to simulate real-world electricity metering and consumption monitoring processes, as well as remote monitoring and control of electric power facilities. Students gain hands-on experience in transmitting telemetry data to dispatch centers, converting analog signals into digital values, visualizing parameters in real time, generating graphs, and processing alarm signals. A key feature of the laboratory is the opportunity to practice the complete dispatch control and management cycle, from receiving measurement data to analyzing equipment conditions and responding to abnormal situations using SCADA software.

**Effectiveness:** The effectiveness of the Automated Systems in the Electric Power Industry laboratory lies in improving the quality of students' practical training through the acquisition of skills in modern automated electricity metering, dispatch monitoring, and control of energy facilities. Working with ACEMS, SCADA, and telemechanics training stands helps students develop professional competencies in electricity consumption monitoring, analysis of technological parameters, digital data processing, emergency detection, and operational decision-making. The laboratory helps align the educational process with real-world industrial practices, enhances graduates' readiness for employment in the electric power sector, and develops their ability to apply digital technologies in the energy industry.

