

Department: Foreign Languages

Direction:

- ✓ Foreign Language: 2 Foreign Languages;
- ✓ Foreign Philology

Innovative course topics:

- Digitalization of foreign language education;
- Management in language education;
- Professional and academic foreign language;
- Modeling of professional competences in language education, computer linguodidactics;
- Professional foreign terminology in linguistics;
- Modern methodology of foreign language studies;
- Linguodidactics in higher education;
- Innovation in Linguistics, Intercultural Communication.

Department: Technological Equipment, Mechanical Engineering and Standardization

Direction:

- ✓ Computer modeling of technological processes;
- ✓ Resource-saving technologies of processing of hard-to-machine materials;
- ✓ Certification of materials and equipment.

Innovative course topics:

- Solid modeling
- Surface modeling
- Machining of parts on CNC lathes and milling machines
- Computer simulation of the part machining process based on a developed program, considering the geometric parameters of the machine's work zone, tools, and fixtures used
- Combined machining methods
- Thermo-frictional cutting of metal blanks with pulsed cooling
- Rotational machining of planes, external and internal cylindrical surfaces
- Thermo-frictional processing of flat surfaces and grooves with pulsed cooling
- Concept of certification
- Approval from the Ministry of Emergency Situations for the use of technologies, technical devices (equipment), and materials in the Republic of Kazakhstan
- Certification of equipment in Kazakhstan
- Certification of materials (construction, road construction, plastics, rubber products, and metal products)
- Material testing
- Requirements for testing laboratories
- Industrial safety declaration of the Republic of Kazakhstan
- Industrial safety requirements for certification objects
- Regulatory and legal framework of the Republic of Kazakhstan in the field of industrial safety

Department: Nanotechnology and Metallurgy

Direction:

- ✓ Methods of objective selection of materials for parts with high performance properties;
- ✓ Modern energy- and resource-saving technologies in metallurgy;

- ✓ Modeling of metallurgical processes and products on the basis of computer programs.

Innovative course topics:

- Classification of materials. Contemporary view of the structure of materials;
- Innovative aspects of contemporary materials science;
- Modern methods of material research;
- Modern methods of production and processing of materials;
- Typology of properties. Influence of composition and external factors on material properties;
- Cybernetic approach to materials selection;
- Optimization of material selection by comparison methods;
- Involvement of off-balance, secondary raw materials and raw materials of technogenic origin in metallurgical production;
- Use of slags and sludge in the production of by-products;
- The role of resource-saving technologies in solving the problems of ferrous and non-ferrous metallurgy;
- Recycling of metals and materials as an effective direction to reduce the load on the raw material base of metallurgy;
- Extraction of rare metals in complex processing of polymetallic ores;
- Methods and criteria of evaluation of energy saving efficiency;
- Energy saving and ecology;
- Renewable energy sources in the energy strategy.

Department: Vocational Education and Pedagogy

Direction:

- ✓ Vocational and pedagogical direction.

Innovative course topics:

- Innovative technologies in pedagogical education;
- Media education;
- Competency-based approach in education;
- Information technologies in the teaching process;
- Educational systems management;
- Forecasting and planning the development of the education system;
- Information and technological support for the educational process;
- Innovative processes in education;
- Pedagogical ergonomics;
- Pedagogical technique;
- Axiology of Vocational and Pedagogical Education;
- Vocational orientation and self-determination;
- Intensification of educational interaction;
- Educational environment of higher education institution as a factor of formation of students' professional competencies;
- Mediadidactics.

Department: Physics

Direction:

- ✓ Establishing the structure of organic substances by X-ray diffraction analysis.

Innovative course topics:

- X-ray structural analysis.

Department: Technology of Systems and Communication

Direction:

- ✓ CCNA Routing and Switching;
- ✓ Welding of fiber-optic communication lines;
- ✓ Development of security and safety systems for special objects based on fiber optic technologies;
- ✓ Development and implementation of an automated explosion-proof system for monitoring the technical condition of mine workings based on fiber-optic sensors.

Innovative course topics:

- Explanation of how networking technologies work;
- Explanation of the principles of how devices perform access to local and remote resources;
- Description of the router hardware;
- Explaining how switching works in a small or medium-sized company's network environment;
- Designing an IP Addressing Scheme to Provide Network Connectivity in a Small or Medium Business Network;
- Configuring initial settings on the network device;
- Establish basic network connectivity between devices;
- Performing the configuration of monitoring tools that exist for small or medium-sized business networks;
- Determining how a router will redirect traffic depending on the data in the routing table;
- Explaining how switching works in an SMB company network environment;
- Utilize monitoring tools and network management protocols to troubleshoot network problems;
- Configuring monitoring tools that exist for SMB networks;
- Configuring initial settings on a network device;
- Configuring Ethernet ports on a switch;
- VLAN deployment;
- Performing static routing and RIPv2;
- Implementing DHCP on a router;
- Implementing Network Address Translation (NAT);
- Implementing access control lists (ACL) to filter traffic;
- Introduction to FOTS;
- Finding faults on a FOTS site;
- Familiarization with FOTS welding equipment;
- Operation of fiber optic transmission lines under different conditions;
- Safety precautions during installation, welding and testing of fiber optic cables;
- Organization of fiber optic-based networks;
- Introduction to optical technologies;
- Terminology of safety and security systems for special facilities;
- Theory of development of unique mathematical and computer models of automated security monitoring system based on fiber optic sensors;

- Theory of development of hardware-software complex and control algorithm of convergent safety and security systems of new generation for special objects based on fiber-optic technologies;
- Measures when conducting tests with subsequent adjustments and changes in the design to achieve optimal performance of high sensitivity;
- Guidelines for the creation of prototypes of convergent systems of protection and security of new generation for special objects based on fiber-optic technologies with high metrological and speed characteristics with adaptation in real conditions of the protected object;
- Theory of development and creation of mathematical and computer models;
- Introduction to technologies based on fiber-optic sensors;
- The concept of automated explosion-proof monitoring system;
- Theory of complex research on the basis of system approach for obtaining adequate mathematical and computer models of the automated explosion-safe system of monitoring the technical condition of mine workings based on fiber-optic sensors and intelligent sensor networks;
- Theory of development of hardware-software complex of monitoring system and control algorithm of intellectual sensor network;
- Guidelines for the creation of laboratory samples;
- Necessary measures during testing and subsequent adjustments and modifications to the design to achieve optimal performance.

Department: Power Engineering Systems

Direction:

- ✓ CAD in the electric power industry;
- ✓ CAD in thermal power engineering;
- ✓ Analytical research and development of a package of computer programs for predicting the properties of electrical materials for power engineering, insulation and high voltage technology.

Innovative course topics:

- Modes. Using object snap, object tracking, and grid. Drawing basics in AutoCAD;
- AutoCAD dimensioning. Layers in AutoCAD. Course on electrical networks in AutoCAD;
- COMPAS Electric. Development of schematic circuit diagram;
- COMPAS Electric. Development of schematic diagram;
- COMPAS Electric. Work with traces;
- Development of documentation for Programmable Logic Controller;
- Creation of personal library with AutoCAD graphic editor;
- Modern systems of electric power engineering. World trends in the electric power industry. Criteria of information technology efficiency;
- Peculiarities of application of mathematical modeling method in power engineering. Modeling as a method of scientific cognition;
- Modeling of electric power systems;
- Analytical research and development of computer program package;
- Properties of electrotechnical materials, insulating technology and high voltage technology;
- Information technologies in electric power engineering and electrical engineering;
- Theory and technique of scientific experiment.

Department: Automation of Production Processes

Direction:

- ✓ Hardware-software complexes of modern mechatronic and robotic productions;
- ✓ Software and hardware complexes of means and systems of automation of technological processes and productions;
- ✓ Languages of controller programming;
- ✓ Design technology of local automation systems on the basis of hardware-software complexes;
- ✓ Technologies of tuning and adjustment of means and systems of automation;
- ✓ Technologies of optimization of modes of operation of automation equipment and systems.

Innovative course topics:

- Basic CoDeSys Course;
- Advanced CoDeSys Course;
- Basic Step7 Course;
- Advanced Step7 Course;
- Basic WinCC Course;
- Advanced WinCC Course;
- Basic TIA-portal Course;
- Advanced TIA-portal Course;
- Basic Mitsubishi Electric User-Level Course;
- Basic Mitsubishi Electric Developer-Level Course;
- Advanced Mitsubishi Electric Course.

Department: Information Computation Systems

Direction:

- ✓ Simulation modeling and spatial-technological analysis of static thermal-hydraulic regimes of the district heating system;
- ✓ Methodology of building a digital 3D model of structural features of geological objects according to the data of reserves estimation;
- ✓ Development and implementation of SMART technologies for improving the level of knowledge and qualification.

Innovative course topics:

- Enterprise IT infrastructure (in English);
- Intelligent systems;
- Development of a decision support system for production management.

Department: Information Technologies and Security

Direction:

- ✓ Information Technology;
- ✓ Information and Measurement Technology.

Innovative course topics:

- Computer modeling;
- Technologies of information security;
- Technical means of information-measuring systems.

Department: Chemistry and chemical theory

Direction:

- ✓ Technology of oil, gas and coal processing;
- ✓ Pharmaceuticals Technology.

Innovative course topics:

- Chemical engineering and chemical industry;
- Synthesis of biologically active substances based on alkaloids.

Department: History of Kazakhstan

Direction:

✓ Kazakhstan in the global space of the modern world: socio-political, cultural and spiritual aspects.

Innovative course topics:

- The policy of forming a new historical consciousness and worldview of the people of the Great Steppe;

- “Mäñgılik El” – the idea of national consolidation, interethnic communication and social harmony;

- The role of Al-Farabi in comprehension of national history, culture and self-consciousness of the people;

- Abay in the world cultural space;

- N.A. Nazarbayev - personality in history;

The content and historical significance of the national program “Intellectual Nation - 2020”;

- Formation of spiritual and moral personality in the context of cultural and historical heritage of the people of Kazakhstan;

- Kazakhstan on the way to Independence: stages of formation of the idea of a nation-state.

Department: Architecture and Design

Direction:

- ✓ Modern methods of monitoring building structures;

- ✓ Innovative methods of construction and architecture in regional conditions.

Modern methods of monitoring building structures;

Innovative methods of construction and architecture in regional conditions.

Innovative course topics:

- Modeling of architectural objects;

- Additional options for working with objects. Learning the basic techniques of working with the V-Ray visualizer. Getting to know the main V-Ray scrolls;

- Principles of creation of architectural objects;

- Modeling of furniture and accessories;

- Polygonal editing of scene objects;

- Working with textures. Universal VRay texture type. Using the universal texture type. VRay texture maps. Reflection in environment textures;

- Light sources. VRayLight light source. Source shapes. VRayLight VRaySun light source. Working with Daylight system. Creating light spots. VRayAmbientLight source;

- Working with projection windows in 3ds max. Introduction to the VRay visualizer. Enabling VRay. Introduction to the working environment and interface of the VRay visualizer;

- Setting up work with materials;

- Standard primitives;

- Complex primitives;

- Splines;

- Composite objects;

- Mental Ray Materials;

- Lighting systems. Global illumination. Global illumination parameters;

- Camera control;

- The concept of visualization;

- Mental Ray renderer;

- Autocad and 3D modeling;

- Archicad and 3D modeling. Construction of figures

Department: Mechanics

Direction:

- ✓ Applied mechanics;
- ✓ Reliability of technical systems;
- ✓ Numerical methods for solving problems in mechanics.

Innovative course topics:

- Application of numerical methods to solve problems in mechanics.

Department: Construction materials and technologies

Direction:

- ✓ Modified concretes with using man-made industrial waste;
- ✓ Geotechnical design according to Eurocode and innovative construction technologies;
- ✓ Study properties highly efficient modified binders and concrete;
- ✓ Development of fire-protective and anti-corrosion materials for building structures.

Innovative course topics:

- Theoretical foundations of the use of industrial waste for the production of building materials;
- Application of blast furnace granulated slag in the building materials industry;
- Analytical and experimental studies on the selection of quantitative ratios between source materials;
- Processes of hydration of granulated blast furnace slag;
- The influence of additives on the hydration process;
- Eurocodes in construction;
- The structure of Eurocodes and their interrelationships;
- Impact on structures;
- Design of composite metal and reinforced concrete structures;
- Geotechnical design.
- Modern modifying additives for concrete production;
- Modifying additives and the mechanism of their action on concrete;
- Methods for studying the properties of binders and concrete;
- Rheological properties of concrete mixture;
- Physical and mechanical properties of modified concrete;
- Performance properties of modified concrete
- Definition and classification of corrosion. Passivity of metals;
- Destruction of coatings during operation;
- Classification and characteristic ways protection. Protection metals anti-corrosion and fire-protective materials;
- Methods for determining anti-corrosion and fire-protective properties of coatings;
- The main components included in anti-corrosion and fire-protective materials;
- Technology for the production of anti-corrosion and fire-protective materials.

Department: Russian language and culture

Direction:

- ✓ Russian philology.

Topics of the innovative course:

- Russian language: current issues of Russian studies.

Department: Transport equipment and logistics systems

Direction:

- ✓ Fundamentals of scientific research;
- ✓ Mathematical modeling in scientific research.

Innovative course topics:

- Methodology, concepts and terms of scientific research;
- Methods of theoretical research;
- Methods of mathematical analysis;
- Experimental research;
- Application of mathematical statistics in experimental research;
- Mathematical modeling;
- Construction of calculation schemes for dynamic systems;
- Modeling of components of lifting machines;
- Optimal criteria for making management decisions.

Department: Industrial transport

Direction:

- ✓ Development and research of a system for optimizing the locomotive control mode (at industrial enterprises);
- ✓ Development and research of exhaust gas isolation system on underground self-propelled vehicles;
- ✓ Research and development of a method for calculating the design and operating mode of the traction and carrying element of a steep-angle conveyor with a linear drive;
- ✓ Research and development of linear drive steep inclined conveyor for opencast mining.

Innovative course topics:

- Study of the operation of a medium-duty hump at the Karaganda-Sortirovochnaya station;
- Development of a daily schedule plan for railway stations;
- Development of a daily schedule plan for marshalling station;
- Development of train schedules for railway stations.

Department: Kazakh language and Culture

Direction:

- ✓ Actual problems of Kazakh philology;

Innovative course topics:

- Ways of language vocabulary transmission in the Kazakh language;
- Artistic features of dramatic work;
- Trading language;
- The harmony of man and nature in Kazakh novels;
- Artistic time and space in Kazakh novels;
- Literary trend and criticism;
- Semantic ambiguities in which the word is used;
- Kazakh folkloristics;
- Ways of formation of Kazakh literary studies;
- Effective methods and techniques of teaching the Kazakh language.

Department: Higher mathematics

Direction:

- ✓ Application of differential equations to solving engineering problems;
- ✓ Applied mathematics.

Innovative course topics:

- Tasks, leading to differential equations with separable variables;
- Problems leading to homogeneous differential equations of the first order;
- Problems leading to differential equations in total differentials;
- Problems leading to first-order linear differential equations;
- Problems leading to systems of linear differential equations of the first order;
- Problems leading to systems of linear differential equations of the second order;
- Probability theory;
- Mathematical statistics;
- Mathematical modeling.

Department: Mine aerology and labor protection

Direction:

- ✓ Elimination of consequences of man-made and natural emergencies;
- ✓ Modern problems of ergonomics;
- ✓ Professional health;
- ✓ Planning and management of scientific and innovative activities.

Innovative course topics:

- Features of liquidation of consequences of chemical accidents;
 - Emergency risk management;
 - The role of man in the safety of the human environment;
 - Ergonomic approach to standardization of factors of the production environment.
- Adaptation of conditions and tools of work to a person;
- Principles, methods and means of ensuring security;
 - Mental health and occupational health;
 - Reviewing research papers. Reporting on the work. Preparing the abstract of the report;
 - Preparation of scientific materials for publication in print.

Department: Geology and exploration of mineral deposits

Direction:

- ✓ Coal deposits of Central Kazakhstan;
- ✓ Ore deposits of Kazakhstan
- ✓ Geophysical methods for quality control of mineral raw materials

Innovative course topics:

- Raw materials for the coal chemical industry;
- Geological and geophysical research for the purpose of constructing a 3D model;
- Coal gasification to produce synthesis gas;
- Geological surveys and studies of coal deposits;
- Mineral impurity in coals;

Department: Development of mineral deposits

Direction:

- ✓ Geotechnological research by justification parameters sustainability rock massif;
- ✓ Research on safe mining operations based on preliminary degassing of coal seams;
- ✓ Development of contour technologies for supporting mine workings;
- ✓ Increasing the shelf life of coal.

Innovative course topics:

- Geomechanical/geotechnical modeling;
- Design of mining and technical systems;
- Improving the technology of fastening and stabilizing rock massifs

Department: Mine surveying and geodesy

Direction:

- ✓ Geotechnical assessment of the state of the mining massif at open-pit mines and underground mines;
- ✓ Observations for deformations unique and man-made geodetic structures;
- ✓ Design of geodetic networks for terrestrial, satellite and space images.

Innovative course topics:

- Digital technologies in the field of geodetic, cartographic and cadastral works using unmanned aerial vehicles and remote sensing equipment;
- Safe provision of mine surveying and mining operations based on the introduction of digital technologies.

Department: Economics and management of the enterprise

Direction:

- ✓ Economic support for geological, mining, and mining and metallurgical works at enterprises in Kazakhstan;
- ✓ Development of international cooperation and modern integration processes with the aim of unifying requirements and improving the systems of economic training of specialists in engineering educational programs;
- ✓ Diversification of Kazakhstan's industry is the basis for its effective operation;
- ✓ Financial markets of the Republic of Kazakhstan - development problems;
- ✓ Creation of an innovative economy in Kazakhstan: main directions;
- ✓ Statistical issues in the study of socio-economic phenomena;
- ✓ System of national accounts and main macroeconomic indicators;
- ✓ Current economic issues.

Innovative course topics:

- Economy and commercialization of innovations;
- Concepts and definitions in the field of innovation activities;
- Business planning of innovation processes;
- Modern approaches to business valuation;
- Prospects business models: «Blue oceans», management entrepreneurship, demand-side innovation and sustainable development;
- Experience of using the case study method in teaching economic disciplines;
- Systems for training specialists in the field of management;
- Problems socio-economic development creative spaces in Kazakhstan;

Department: Engineering entrepreneurship and marketing

Direction:

- ✓ Business consultant;
- ✓ Marketing analyst.

Innovative course topics:

- Entrepreneurship and business (basic course);
- Evaluation of investment projects (advanced course);
- Project management (basic course).

Department: Assembly of the people of Kazakhstan and social and humanitarian disciplines

Direction:

✓ Mechanisms for studying the preservation of national identity in the context of globalization.

Innovative course topics:

- Organization of a working group to conduct sociological research;
- Stages of applied sociological research;
- Methodology for conducting sociological research;
- Development of a research program and plan;
- Analysis of basic concepts;
- Basic requirements for a literature review in a sociological research program;
- Collection of sociological information;
- Design of a sociological research questionnaire;
- Questions of the socio-demographic block;
- Practical aspects of planning and organizing a sample for sociological research;
- Analysis and use of the results of sociological research.