

NCJS «KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY
named after K.I.SATBAYEV»



Institute of Architecture and construction named after T.K. Basenova

Department of Engineering systems and networks

**ADDITIONAL EDUCATIONAL PROGRAM (Minor)
«Technosphere safety»**

Almaty 2022

Additional educational program (Minor) «**Technosphere safety**» was approved at the meeting of K.I. Satbayev KazNRTU Academic Council

Minutes # 13 dated «28» April 2022.

was reviewed and recommended for approval at the meeting of K.I. Satbayev KazNRTU Educational and Methodological Council

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Additional educational program (Minor) «**Technosphere safety**» developed by Academic committee:





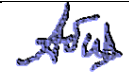
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1. Description of additional educational program (Minor)

The program is aimed at training specialists in ensuring labor safety, as well as industrial and environmental safety in various areas of industry. During the training, students conduct research and apply methods for analyzing and assessing hazardous and harmful factors in production, identifying potential risks and developing appropriate protective measures. Within the framework of the program, special attention is paid to modern industry trends and digitalization models in the field of labor safety, industrial and environmental safety.

2. The purpose and objectives of additional educational program (Minor)

The purpose of additional educational program (Minor): The purpose of the additional educational program (Minor): is to prepare specialists for work in the field of technosphere safety for various industries.

Tasks of additional educational program (Minor): to study the theoretical and practical foundations of technosphere safety; organizational and regulatory framework for labor protection, industrial and environmental safety; modeling in the technosphere safety forecasting system; technique and technology of protection in the technosphere.

3. Learning outcomes

- the ability to assess risk and determine measures to ensure the safety of equipment and protection technology in the technosphere;
- readiness to use the main methods of protection of production personnel and the population from the possible consequences of accidents, catastrophes, natural disasters;
- ability to model in the technosphere safety forecasting system;
- willingness to use knowledge on the organization of labor protection, environmental protection and safety in emergency situations in various areas of industry;
- be able to develop an industrial safety declaration depending on the specific hazards of the enterprise;
- the ability to determine the main methods and measures for the engineering protection of the environment from the impact of industrial enterprises.

4. Catalog of disciplines

Code and name of the discipline: SAF218 Protection engineering and technology in the technosphere

Number of credits: 5 (1/0/2/2)

Component: Profile (component of choice)

The purpose and objectives of the course: The purpose of mastering the discipline is to develop in students the competencies necessary to create a comfortable (normative) state of the environment in the areas of human labor activity, as well as to study measures to protect people from negative production factors.

Brief description of the course: To study methods and ways of solving practical engineering problems and scientific and technical problems in the field of basic methods for protecting production personnel and the population from the possible consequences of accidents, catastrophes, natural disasters, assess risk and determine measures to ensure the safety of production personnel.

Knowledge, skills, competences at the course end:

Know:

- the main features of production technologies, consumption, service, classification of technologies and characteristic features of the main groups of technologies;
- the main man-made hazards, the nature of the impact of harmful and dangerous factors on the human body and the natural environment, and methods of protection against them;
- scientific and organizational foundations for the safety of production processes;
- the main features of production technologies, consumption, service, classification of technologies and characteristic features of the main groups of technologies.

Be able to:

- evaluate the potential and prospects of certain technological solutions;
- to carry out engineering and environmental analysis between the parameters of technological processes and changes in the environment.

Demonstrate skills and experience:

- in the field of minimizing hazards in sources;
- in measuring the levels of hazards in production, using modern technology;
- in order to ensure the safety of the working environment.

Code and name of the discipline: SAF113 Environmental Engineering

Number of credits: 5 (1/0/2/2)

Component: Profile (component of choice)

The purpose and objectives of the course: The purpose of the discipline is the formation of students' competencies in the field of theoretical and practical knowledge on the main methods of environmental protection. Objective: to teach students how to calculate cleaning by emissions and discharges into the environment.

Brief description of the course: To study the methods and patterns of physical and chemical processes of environmental protection, the basics of technologies for cleaning dust and gas emissions, liquid discharges, disposal and processing of solid waste, the physical principles of protecting the environment from energy impacts, physical and chemical processes for cleaning industrial emissions in the atmosphere and effluents in the hydrosphere.

Knowledge, skills, competences at the course end:

- know the basic physical and chemical laws of purification of aerosols, colloidal systems, solutions and wastewater;
- know the basic physical and chemical processes underlying the disposal of solid industrial waste;
- know the principles of environmental protection from energy impacts;
- be able to explain from a scientific point of view the phenomena, processes occurring during the purification of gas emissions in the atmosphere, wastewater in hydrosphere and solid waste in the lithosphere;
- be able to choose the right method and method of cleaning the atmosphere, hydrosphere, lithosphere during the release and discharge of industrial waste into them;
- be able to assess the main parameters of physical and chemical processes of environmental protection;
- be able to choose the right method of protection against energy impacts.
- be able to apply methods and techniques for limiting anthropogenic impact on the environment, modern methods and means of engineering environmental protection, modern developments of effective environmental protection measures, taking into account the environmental, social and economic interests of society, research methods, rules and conditions for performing environmental work.

Code and name of the discipline: SAF114 Industrial Safety Declaration

Number of credits: 5 (1/0/2/2)

Component: Profile (component of choice)

The purpose and objectives of the course: The purpose of the discipline is to form students' knowledge about the areas of activity that require mandatory licensing by the state bodies of the Republic of Kazakhstan; skills on the specifics of conducting an industrial safety review, on the basics of declaring and developing an industrial safety declaration, means of improving safety and industrial production.

Brief description of the course: learn how to use legal and regulatory and methodological literature when developing an industrial safety declaration, as well as the basics of industrial safety expertise.

Knowledge, skills, competences at the course end:

- Use the main regulatory legal acts, guidelines, codes of practice, the basic principles for conducting an industrial safety review, the specifics of industrial safety declaration and the specifics of their structuring;
- Solve complex and problematic issues in the field of industrial safety declaration;
- Possess skills in assessing industrial safety and environmental friendliness of projects;
- based on the analysis of the current security system at the facility, develop measures to improve its effectiveness;
- Be able to develop an industrial safety declaration at a hazardous production facility.

Code and name of the discipline: SAF229 Modeling in the Technosphere Safety Prediction System

Number of credits: 5 (1/0/2/2)

Component: Profile (component of choice)

The purpose and objectives of the course: The purpose of mastering the discipline is to study the methodology of system thinking and comprehensive consideration of complex problems, to acquire knowledge and skills in multi-aspect modeling, to acquire knowledge in the field of modeling real processes and phenomena that underlie the safety of technical systems, and to acquire the skills to use the acquired knowledge in practical work.

Brief description of the course: The study of typical techniques for modeling various processes and phenomena; basic principles of mathematical modeling; obtaining theoretical knowledge in the field of mathematical modeling for predicting the behavior of technical systems and assessing the stability of objects, as well as the development of hazards in order to predict them, simulate the consequences and manage them.

Knowledge, skills, competences at the course end:

- Navigate in the prospects for the development of technology and technology to protect humans and the natural environment from man-made and natural hazards;
- Develop and use graphic documentation;
- Measure the levels of hazards in the environment, process the results, make forecasts of the possible development of the situation;
- Analyze the mechanisms of the impact of hazards on a person, determine the nature of the interaction of the human body with the dangers of the environment, taking into account the specifics of the mechanism of the toxic effect of harmful substances, energy effects and the combined effect of harmful factors.