

## SYLLABUS “PROFESSIONAL RISK MANAGEMENT SYSTEM”

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**Department responsible for the course or equivalent:** Institute of Management in Economic, Ecological and Social Systems; Department of ecology and life safety.

**Semester when the course unit is delivered:** 8<sup>th</sup>

**Level of course unit:** Bachelor level

**ECTS credits:** 5

### ADMISSION REQUIREMENTS

Applicants are expected to have completed the following courses:

- Life safety.

### COURSE OBJECTIVES (AIMS)

- to study of a systematic approach to occupational risk management, the development of skills for identifying potential man-made hazards and modeling production risks,
- formation of skills for quantitative, qualitative analysis and risk forecasting, the development of a risk management system capable of providing an acceptable level of protection of the organization, taking into account the possibility of implementing the identified risks.

### Session 1. Professional risks.

Quantitative and qualitative methods of risk analysis. Analysis and assessment of professional risks. The concept and essence of danger and risk. Sources of risk. Risk and probability. Objective and subjective understanding of risk. The main approaches to risk classification. Industrial, environmental, investment, credit, technical, political, financial risks. Professional risks. Methods and tools for risk identification. Sources of information for identification. Expert and social, individual and group methods of risk identification. Brainstorming, checklists, preliminary hazard analysis. Methods of risk analysis and assessment. Quantitative and qualitative methods of risk analysis. Methods: event trees, failure trees, cause-effect diagram, "what happens if", security control maps, criticality analysis, scenario analysis. Estimation of the probability value. Damage assessment. Assessment of the amount of damage. Classification of damage assessment methods. Damage assessment models: calculation of dispersion of harmful substances, damage factors. Calculation of the degree of risk. Methods for

calculating the degree of risk. Risk magnitude scale. Analysis and assessment of professional risks. Analysis of documents on acceptance and commissioning of production facilities and assessment of their compliance with state regulatory requirements for labor protection.

## **Session 2. Modeling and system analysis of dangerous processes in the technosphere and occupational risks.**

The process of risk analysis and its forecasting. Production risk assessment criteria: domestic and foreign experience. System analysis and modeling of systems and processes. The concept of system analysis. The concept of a system. Classification of systems. Technosphere as a system. Management of systems based on mathematical models. Modeling of systems and processes. Types of modeling. Classification of models. Principles and stages of building models. Construction and use of professional risk models in practice. Methods and means of ensuring human safety (at work, in the environment) and environmental safety in accordance with the requirements in the field of safety, including in the field of minimizing secondary negative impacts.

## **Session 3. Regulatory and legal regulation and risk management.**

State strategy in the field of reduction of technogenic risks. Concepts, principles, methods of system analysis and synthesis of industrial and environmental safety by forecasting and regulating the risk parameters of those accidents that are possible during the operation of equipment. Information technologies used to optimize measures to substantiate, ensure, control and maintain socially acceptable quantitative indicators of insurance and technogenic risk. Standards in the field of risk management of the organization

## **Session 4. Professional risk management and evaluation of its effectiveness.**

Methodological foundations of professional risk management. Risk analysis and assessment. Basic approaches to risk management. Environmental risk management. The general scheme of the risk management process. Characteristics of risk management methods. Risk avoidance, risk reduction, risk taking, risk transfer, risk sharing. Risk insurance. Criteria for selecting the method. Risk communication. Risk management levels. Monitoring and control of residual risks, identification of new risks, Development of risk mitigation measures and assessment of their effectiveness. Risk management in the enterprise. Risk management at the enterprise. The purpose and objectives of risk management. Laws and principles of risk management. Risk management system at the enterprise. Assessment of the effectiveness of risk management. Occupational safety in the occupational risk management system.

## LEARNING OUTCOMES

### **Knowledge:**

- principles and methods of analysis and assessment of occupational risks,
- tools and technologies of occupational risk management to reduce their levels.

### **Skills:**

- conduct quantitative, qualitative analysis,
- model and predict professional risks,
- skills of analyzing occupational risks to reduce them,
- taking into account working conditions, safety culture and risk-oriented thinking.

### **Learning Outcomes:**

- risk assessment and mitigation measures,
- creating and analyzing models of the studied processes and objects,
- development of a risk management system that can provide an acceptable level of protection for the organization, taking into account the possibility of implementing the identified risks.

## PLANNED LEARNING ACTIVITIES AND TEACHING METHODS

In the implementation of the discipline " PROFESSIONAL RISK MANAGEMENT SYSTEM", various educational technologies are used, taking into account the introduction of innovative methods and methods of teaching while using traditional methods. Conducting lectures and practical classes is carried out with the statement of problematic issues that allow the emergence of discussions, which implies the active involvement of students in the educational process.

The lecture course contains theoretical material that reflects the current state of scientific concepts on this topic and is supported by explanations and comments on specific application examples of implementation. During the lecture session, students listen to the teacher, ask questions, and take notes on some of the information. At the same time, computer, projection technology and presentations are actively used, which focus the audience's attention on the key points of the lecture material and focus on a consistent presentation of the material when analyzing specific situations of a problematic nature.

Practical classes on the course include elements of an interactive problem-oriented approach to learning by focusing students' attention on the analysis and resolution of specific tasks.

Independent work is aimed at developing an understanding of the application of the materials considered in the framework of the theoretical course in the practical aspect when solving professional tasks.

Independent work is mainly carried out by studying lectures (includes preparation for tests) and preparing for practical classes (includes preparation for test tasks and project tasks).

The final control of material assimilation is carried out in the form of a credit at the end of the semester.

Forms of current control of progress: control papers, test tasks. Forms of boundary control of academic performance: project tasks.

#### ASSESSMENT METHODS AND CRITERIA

Criteria for evaluation:

##### **Test**

- 5 points are awarded to the student if they answer 10 questions correctly;
- 4 points are awarded to the student if they correctly answer 8-9 questions;
- 4 points are awarded to the student if they correctly answer 6-7 questions;
- 3 points are awarded to the student if they correctly answer 1-5 questions;

I module: 4 tests with 5 points (20 points)

Module II: 4 tests with 5 points (20 points)

A student scores 40 points per semester.

##### **Control papers**

- 5 points are awarded to the student if he / she correctly presents the material in writing, demonstrates the assimilation of the entire volume of knowledge, skills and abilities in accordance with the program, and freely applies the knowledge obtained in practice;
- 4 points are awarded to the student if they demonstrate the assimilation of the program material and allow inaccuracies in the answers;

- 3 points are awarded to the student if they demonstrate knowledge of the program material, but make mistakes in the answers;
- 1-2 points are awarded to the student if they have separate ideas about the material and make gross mistakes in their answers.

I module: 2 test papers with 5 points (10 points)

Module II: 2 test papers with 5 points (10 points)

A student scores 20 points per semester.

### **Project specification**

- 20 points are awarded to the student if they completed all the calculation tasks correctly, drew graphs and made the necessary conclusions;
- 17-19 points are awarded to the student if they made 1-2 minor mistakes in the calculation tasks, drew graphs, and made the necessary conclusions;
- 12-16 points are awarded to the student if they made 3-4 mistakes in the calculation tasks, drew graphs, and made inaccurate conclusions.

Less than 12 points for the work is not issued, it is sent to the student for revision, taking into account the noted errors to bring the work into compliance with the requirements.

Module I: first part of the project task (professional risk assessment) (20 points)

Module II: second part of the project task (system analysis and risk management) (20 points)

A student scores 40 points per semester.

### COURSE LITERATURE (RECOMMENDED OR REQUIRED)

- Kamenskaya E. N. life Safety and risk management [Text]: Textbook / - M.: IC RIOR, SIC INFRA-M, 2019. - 252 p. [Electronic resource] - URL: <https://znanium.com/catalog/product/541962>
- Belov S.V. Risk management, system analysis and modeling in 3 h. Part 1-3: Textbook and workshop for undergraduate and graduate studies. - Lyubertsy: Yurayt, 2016. <https://static.my-shop.ru/product/pdf/226/2259267.pdf>
- Volkova A. A. System analysis and modeling of processes in the technosphere: A textbook / A.A. Volkova, V.G. Shishkunov. - Yekaterinburg: Ural Publishing House. un-ta, 2019. [https://elar.urfu.ru/bitstream/10995/70317/1/978-5-7996-2600-6\\_2019.pdf](https://elar.urfu.ru/bitstream/10995/70317/1/978-5-7996-2600-6_2019.pdf)

- Belov S.V. Life safety and environmental protection (technosphere safety): textbook for bachelors. - M.: Yurayt Publishing House, 2019. [https://www.studmed.ru/view/belov-sv-red-bezopasnost-zhiznedeyatelnosti\\_5f781f435e3.html](https://www.studmed.ru/view/belov-sv-red-bezopasnost-zhiznedeyatelnosti_5f781f435e3.html)
- Vorontsovsky A.V. Risk management: textbook and workshop for undergraduate and graduate studies. - Lyubertsy: Yurayt, 2016. <https://static.my-shop.ru/product/pdf/384/3832010.pdf>
- GOST R 51901.2-2002 "Risk management. Risk analysis of technological systems". <http://docs.cntd.ru/document/1200030153>
- Zvonarev S. V. Fundamentals of mathematical modeling: Textbook. - Yekaterinburg, 2019. [https://elar.urfu.ru/bitstream/10995/68494/1/978-5-7996-2576-4\\_2019.pdf](https://elar.urfu.ru/bitstream/10995/68494/1/978-5-7996-2576-4_2019.pdf)
- Kamenskaya E. N. Psychophysiological and ergonomic bases of safety [Text]: textbook / Kamenskaya E. N.; southern Federal University. – Taganrog: Publishing house of southern Federal University, 2019. - 117 p. [Electronic resource] - URL: <https://hub.lib.sfedu.ru/repository/material/800919188/>
- Kamenskaya E. N. Safety and risk management in the technosphere [Text]: textbook / Kamenskaya E. N.; southern Federal University. – Taganrog: Publishing house of southern Federal University, 2018. - 102 p. [Electronic resource] - URL: <https://hub.lib.sfedu.ru/repository/material/800819826/>
- Kamenskaya E. N. Emergency situations of peace and war: a textbook [Text]: textbook on the course "Safety of life". - Taganrog: SFU Publishing house, 2020. - 127 p. [Electronic resource] - URL: <https://hub.lib.sfedu.ru/repository/material/801272720/>