

SYLLABUS “SAFETY AND RISK MANAGEMENT IN THE TECHNOSPHERE”

Lecturer (name, academic title, e-mail): Elena Kamenskaya, professor, e-mail: kamenskyaen@sfedu.ru

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: 4th

Level of course unit: Bachelor level

ECTS credits: 5

ADMISSION REQUIREMENTS

Applicants are expected to have completed the following courses:

- Health culture.

COURSE OBJECTIVES (AIMS)

- to develop a safety culture and development of risk-oriented thinking, in which the issues of ensuring human safety in the modern world are considered as priorities in life and activity,
- development of skills for recognizing hazards associated with human activities, dangerous natural phenomena, dangerous technological processes and industries,
- formation of skills to assess risk and apply measures to reduce it, use the main methods of protecting production personnel and the population from the possible consequences of accidents, catastrophes, natural disasters,
- to know the technology of risk management.

Session 1. Potential dangers in the technosphere.

Indicators of technogenic risk. The concept and essence of danger and risk. Sources of risk. Risk and probability. Objective and subjective understanding of risk. Basic approaches to risk classification. Industrial, environmental, investment, credit, technical, political, and financial risks.

Session 2. The theory of risk.

Taxonomy of risks. Risk analysis taking into account the requirements of the national security strategy. Quantitative and qualitative methods of risk analysis. 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. The assessment of damages. 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. Scale of the risk value.

Session 3. The process of risk analysis and forecasting.

Criteria for assessing production risk: domestic and foreign experience. Modeling and system analysis of hazardous processes in the technosphere. 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. Examples of building and using models in practice.

Session 4. Risk communication.

Levels of risk management. Professional risk management system. Theoretical and methodological foundations of professional risk management. Concepts, principles, methods of system analysis and synthesis of industrial and environmental safety by predicting and regulating the risk parameters of those accidents that are possible during the operation of equipment. Information technologies used to optimize measures to justify, ensure, control and maintain socially acceptable quantitative indicators of insurance and technogenic risk. Methodological foundations of risk management. Risk analysis and assessment. Basic approaches to risk management. Environmental risk management. General outline of the risk management process. Characteristics of risk management methods. Risk avoidance, risk reduction, risk acceptance, risk transfer, risk sharing. Risk insurance. Criteria for selecting the method. Assessment of the effectiveness of risk management.

Session 5. Monitoring and risk management.

Regulatory and legal regulation of safety and risk. State strategy for reducing technogenic risks. 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. Purpose and objectives of risk management. Laws and principles of

risk management. Risk management system in the enterprise. Standards in the field of risk management of the organization.

LEARNING OUTCOMES

Knowledge:

- potential hazards in the technosphere, taxonomy and risk theory,
- quantitative and qualitative methods of risk analysis, production risk assessment criteria,
- theoretical and methodological foundations of professional risk management, regulatory and legal regulation of safety and risk, principles and methods of system analysis, ensuring and improving the safety of processes and systems for production purposes, principles of risk management.

Skills:

- identify potential man-made hazards and simulate production risks,
- predict professional risks, use methods of system analysis and synthesis of safety of processes and objects of technological equipment,
- conduct quantitative and qualitative analysis and forecast risks,
- show a safety culture and risk-oriented thinking,
- apply a systematic approach to risk management in the technosphere.

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 "Security and risk management in the technosphere", 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>
- Ploskin V. life Safety. 2 / V. V. Ploskin-Moscow / Berlin: Direct Media, 2015. - 404 p. [Electronic resource] - URL: <http://biblioclub.ru/index.php?page=book&id=271483>
- Life safety: natural and technogenic factors: Textbook / Alekseyenko Vladimir Alekseevich-Rostov n/ A: Phoenix, 2016. - 270 p. [Electronic resource] - URL: <https://hub.lib.sfedu.ru/repository/material/800392714/>
- Psychological security of the individual and human behavior in an emergency: Textbook / Kamenskaya Elena Nikolaevna, 2017. - 97 p. [Electronic resource] - URL: <https://hub.lib.sfedu.ru/repository/material/800756866/>
- Life safety / E. F. Baranov-Moscow: Altair / MGAVT, 2014. - 164 p. [Electronic resource] - URL: <http://biblioclub.ru/index.php?page=book&id=430026>
- 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., Svirepova M. S. Chemical negative factors in the system "man-environment" [Text]: textbook on the course "Safety of life". - Taganrog: SFU Publishing house, 2016. - 83 p. [Electronic resource] - URL: <https://hub.lib.sfedu.ru/repository/material/800768199/>
- Kamenskaya E. N. Emergencies of a social nature [Text]: textbook on the course "Safety of life". - Taganrog: SFU Publishing house, 2016. - 80 p. [Electronic resource] - URL: <https://hub.lib.sfedu.ru/repository/material/800768198/>
- 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/>