System Analysis and Simulation of Energy Intensive Plants in Circumpolar Regions

Basic information

Duration(ECTS)	360hours (10 ECTS credits)
Starting date	February, 1
Language of instruction	English level B1 (European Framework for Reference of Communicative Skills)
Entry requirements	BSc or MSc degree in Environmental Sciences or Heat power engineering

Course description

This course is devoted to questions of energy security of the Russian Federation, the largest net exporter of oil and gas, deposits in the region account for about 25% of Russia's total hydrocarbon resources.
Special emphasis is made on high risks of development of territories, characterized by a significant investment and technological capacity

Special features

Considers the possibilities of "careful" development of the territory of the Arctic in the context of energy and oil and gas industry.

Course Aim

Mastering the methods of system analysis, mathematical modeling and integrated assessment of the effectiveness of the regional district heating system, improving the modes and structures of automatic heat control systems at the facilities and enterprises of the Far North.

Course Objectives

This course is especially designed to provide students with knowledge of complex system approach for energy intensive sector of industry and economics. Risk reduction methods are provided

Learning outcomes

Upon completion of the course students will master the theoretical foundations of mathematical modeling of systems and processes; ways to ensure the sustainability of the functioning of man-made systems in normal and emergency situations.

Outline of the content

Weeks	Lectures	Practical training	Hours
1, 2	Power systems and patterns of their functioning and development	Theoretical measurements of the levels of hazards, processing of the results, making forecasts of the possible development of the situation	36
3-5	Transients. Feedback principle. Handling, Achievement, Stability	Modeling and system analysis of man-made incidents at power facilities	54
6-8	Principles of formalization and simulation of complex systems	Simulation the hazards of the technosphere object	54
9, 10	Energy-entropic concept and hazard classification	Indicators and criteria for assessing the quality of safety in the technosphere	54
11, 12	Basics of system analysis: the system and its properties; descriptive and constructive definitions in system analysis; principles of consistency and complexity	Planning management decisions based on mathematical-statistical models of systems for energy-intensive industries	54
13, 14	Principles of system analysis and modeling of the process of causing damage	Development of recommendations for reducing the anthropogenic load on the environment for energy-intensive industries	36
15, 16	Risk analysis Basic concepts	Individual risk assessment. Emergency Risk Analysis	36
17, 18	Principles of risk management information technology	Development of various types of risk in industrial facilities of the circumpolar territories	36

Course assessment
By the end of the course students should pass an exam.

Attendance policy
Organization of individual studiesis performed in accordance with the schedule of the educational process. Recommended literature should be studied in order to handle the topics listed above. Assignments given after lectures are used for the monitoring of the educational process.

Contact information

Liudmila Kulagina, Doctor of Technical Sciences, Senior Lecturer. Address:660074, Krasnoyarsk, Kirenskogo str. 26a, Room D 2-04, Polytechnic School of SibFU, tel. +7 (391) 249-73-49E-mail: klvation@gmail.com