

Management Basics of Accumulated Environmental Damage

Basic information

Duration (ECTS)	360 hours (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

The course “**Management Basics of Accumulated Environmental Damage**” is devoted to modern technologies developed for treatment, storage, and disposal of hazardous wastes produced by industrial plants. It is mainly focused on pollution and accumulated environmental damage in Arctic and northern regions. An increased risk of man-made accidents and disasters calls for new approaches of assessment and establishment of environment-oriented industrial technologies. For that reason a unique discipline has been elaborated at SibFU in order to prepare specialists with unique Arctic engineering knowledge and skills.

Special Features

A significant part of Krasnoyarsk Krai occupies a large territory in the basin of the Arctic Ocean; by far the majority of the region is located in severe northern and arctic conditions. Currently, the region is a pilot platform for the implementation of modern strategies aimed at prevention and elimination of environmental damage accumulated during decades of high latitude areas exploitation. Modern technologies and innovative equipment have been developed to provide preservation of the environment and natural resources of high north and Arctic regions.

Course aim

The course aims to introduce basic technologies of hazardous waste management and principal methods used for disposal of the consequences of technogenic accidents under Arctic conditions.

Course objectives

- to make students familiar with the main issues of environmental conditions that should be taken into account within the development of Arctic territories in order to reduce accumulated environmental damage and avoid the risk of emergencies;
- to provide students with profound knowledge of modern technological methods used for utilization, storage and disposal of hazardous wastes;
- to develop skills of solving logistical challenges essential for handling highly dangerous wastes;

- to give students the main information about calculation and design of Eco-friendly technological systems considering special aspects of hazardous waste management.

Learning outcomes of course

After successful completion of the course students should:

- has knowledge about technical and safety issues related to industrial activities and pollution in Arctic regions;
- know appropriate methods and practical guidelines for managing and operating complex technical systems for the control of wastes flow in a harsh environment;
- be able to work independently and propose original solutions on the basis of the latest achievements in the field of wastes management.

Outline of content

Week	Lectures	Практические по дисциплине	Hours
1, 2	The development and operation of technosphere in northern and Arctic regions. Sources of wastes, their classification and composition	Experience in operating industrial plants of <i>Таймыр</i> Dolgano-Nenets Autonomous Okrug in Krasnoyarsk Krai. Risks evaluation of the northern and Arctic regions exploration	36
3, 4	Accumulated environmental damage (AED) as a factor of economic growth deterrence caused by fall of environmental ratings of territories and as a barrier for investments	AED in monetary terms	36
5, 6	Management of highly dangerous wastes. Nuclear industry wastes; methods of their storage and disposal	Technologies improving safety of liquid radioactive wastes storage. Application of hydrodynamic cavitation effects	72
7, 8	Stages of waste management activities. Monitoring environmental conditions on wastes disposal objects	Economic mechanisms of waste control	36
9, 10	Environmental problems of northern cities	Studies of snow cover as an accumulator of pollutants	36
11, 12	Information support in waste management. Environmental insurance and waste auditing	Reporting framework in waste management	36
13, 14	Production of heat from the primary treatment of waste	Processes of generating energy (electricity or heat) from the primary treatment of waste	36
15, 16	Storage, disposal, application of solid waste of various origins. Landfill for waste disposal	Methods of extraction of useful products from solid waste. Experience in data collection, storage and disposal of highly dangerous waste at the landfill that belongs to the department of Tech-	54

		nosphere safety	
17, 18	Resource-saving technologies in domestic and foreign practice. The concept of non-waste production.	Examples of non-waste production in Krasnoyarsk Krai	18

Course assessment

Written and oral examination after completion of the course.

Attendance policy

Organization of individual studies is performed in accordance with the schedule of educational process. Recommended literature should be studied in order to operate on the topics listed above. Assignments given after lectures are used for the monitoring of the educational process.

Contact information

Tatiana Kulagina, Doctor of Technical Sciences, Professor, Room D 2-04, 26a Kirenskogo str., Krasnoyarsk, 660074, Polytechnic School, SibFU, tel. +7 (391) 249-73-49, E-mail: Tkulagina@sfu-kras.ru

<http://www.sfu-kras.ru/en/masters/technosphere-safety#tab2>