ONLINE SHORT-TERM PROGRAMS

Despite the COVID-19 coronavirus pandemic and related restrictions, in 2021 International Competence Centre for Mining-Engineering Education under the auspices of UNESCO organizes a number of **international short-term programs** on the base of **Saint Petersburg Mining University**.

Mining University is one of the top and most dynamically developing technical universities and R&D centers in Russia. Not only we provide a superb education for mining engineers, civil engineers, economists, mechanic engineers, oil and gas engineers, geologists, we are also proud of our extracurricular activities, infrastructure, and location.

All short-term courses will take place in a distanced format using **Zoom**. The platform allows participants to attend the training from anywhere in the world.

Summer schools include lectures and practical classes, master classes and trainings.

The key principle of online courses will be **interactivity**. Teachers will be able to stream real-time videos and presentations online, listeners will be able to ask questions live or send text messages.

To participate, you will just need a computer (laptop) with a camera and a microphone, access to the Internet. All participants will be provided with the necessary technical support and links to connect.

At the end of the training program, our participants will receive **certificates of completion**.

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SHORT-TERM EDUCATIONAL PROGRAM
MODERN MINING TECHNOLOGIES

Purpose of the program:

- The purpose of the program is to acquire theoretical knowledge and practical skills, improve skills in the design and development of deposits of solid minerals.

Main objectives of the program

- Acquisition of additional knowledge in the field of development and implementation of projects on efficient mining operations at mining enterprises;
- Obtaining additional knowledge in the field of designing schemes of stripping, preparation and mining of deposits of solid minerals;
- obtaining additional knowledge in the field of industrial and environmental safety of mining production.

Category of students:

- Students and postgraduates studying in the areas of training related to the development of deposits of solid minerals.

As a result of mastering the program a graduate should be formed the following competencies:

- ability to justify technological schemes of opening, preparation and mining of reserves with the use of means of integrated mechanization and automation of mining works of high technical level;
- readiness to develop innovative technological solutions when designing the development of reserves of deposits of solid minerals;
- possession of methods of rational and complex development of georesource potential of subsoils;
- ability to develop and implement measures to ensure industrial and environmental safety of mining.

In order to achieve the **additional professional competencies** specified in clause 1.4, students in the process of mastering the Short-term program must:

Gain knowledge of:

- about modern challenges and trends of development of techniques and technology of development of deposits of solid minerals;
- modern requirements to the basic technologies of solid minerals mining, means of mechanization and automation of mining works;
- about the basic geomechanical processes and patterns of change in the stress and strain state of the rock mass during mining operations;
- the basic requirements for the design of modern enterprises in the natural-industrial systems;
- about the best technical solutions in the field of opening, preparation, development systems of deposits of solid minerals.

Develop skills:

- justification of spatial and planning solutions for the stripping, preparation and development of deposits of solid minerals;
- justification of parameters of technological schemes of preparation and excavation of excavation areas of modern mines and mines;
- planning of mining works taking into account the maximum use of technical capabilities of modern equipment;
- apply acquired knowledge to solve specific engineering and organizational problems.

To acquire skills:

- choosing the most effective schemes and technologies of opening, preparation and mining of reserves in various mining and geological conditions;
- planning and optimizing the parameters of mining operations using modern software systems.

Sections of the professional module, topics	**Content of the training material**	**Hours**
Introduction. The current state and prospects for the development of technologies of development of deposits of solid minerals	Modern challenges and topical problems of mining. The current state and the main directions of development of techniques and technologies of development of deposits of solid minerals. Specific features of mining-geological and mining-technical conditions for the development of layer deposits. Features of underground, open pit and combined methods of development.	2
Module 1. Modern Underground Mining Technologies	Modern mining systems. Principles of opening and preparation of mine fields and ore bodies. Selection and justification of the scheme of opening and method of preparation. Systems of development of deposits of solid minerals. Classification, requirements, characteristics, advantages and disadvantages, areas of application, development trends. Determination of rational parameters. Classification of processes of underground mining works. Modern means of mechanization of mining operations. The basic requirements for schemes of preparation and mining excavation areas. Requirements, technical characteristics, development trends. Progressive technological schemes of preparatory and clearing works. Special (physical-technical and physical-chemical) technology development.	20
Module 2. Modern open pit mining technologies	The main stages of open pit mining of mineral deposits. Stripping and systems of development of deposits by open-cut method. Determination of parameters and indicators of systems of open-cast mining of deposits. Features of the combined development of deposits. Definition of the boundaries of open-pit mining.	8
Module 3. Digital Mining Transformation and Computer Modeling in Mining	Modern trends and challenges. Industry 4.0, virtual and augmented reality technologies, Internet of things. 3D and 5D concepts. Advanced digital, intelligent and robotic mining technologies. Modern algorithms for the analysis of arrays. data to ensure monitoring of the condition and	8

Sections of the professional module, topics	Content of the training material	Hours
	prospects for the development of mineral resources in Russia and the world. Modern methods of analysis and interpretation of the accumulated geological, geophysical and geochemical information to solve the problems of prediction and search for mineral deposits. Planning and optimization of mining parameters using modern software systems.	
Module 4. Industrial safety, occupational safety and mine rescue basics	The main approaches to the assessment and management of occupational risks, the principles of building a safety management system at different levels of management (from national to enterprise level). Basic international standards on labor protection management systems ISO 45001, ILO-OSH-2001, OHSAS 18001, basic indicators of the state of labor protection at the enterprise, principles of setting goals and objectives, basic information about Vision Zero or "Zero-accident" concept. The concept of automated control systems. Systems for monitoring hazardous factors in the mine. The requirements of regulatory documents in the use of multifunctional safety systems (MFSB). The structure and peculiarities of the functioning of a single control service at the mining enterprise. Scheme of collecting and transmitting information to a single control room. The structure of the control system based on the GPS Granch and the purpose of its use in underground mining. Ventilation of mines and mines. Management of gas release in mine workings. Organization of mine rescue operations. Peculiarities of conducting rescue operations in the elimination of certain types of accidents.	8
Module 5. Mining geomechanics and rock mass condition management	Stress-strain state of the massif "perturbed" by the conduct of underground mining operations. Requirements for methods of managing the state of the massif. Monitoring of the state of the massif. Modern methods for assessing the stress-strain state of rock massifs. Computer modeling of the state of rock mass. Providing operational state of preparatory mine workings. Reducing the impact of mining operations on natural and man-made objects on the earth's surface.	6
Module 6. Reducing the negative impact on the environment	The main environmental problems in the development of deposits of solid minerals. Natural ecological systems, their changes as a result of mining activities. The level of use of energy sources in coal mining. Environmental consequences of the use of energy in mining. Measures to reduce the negative environmental consequences of the operation of energy-intensive mining equipment. Measures for the integrated use of mineral resources. No-waste and low-waste technologies in mining. Allocation of land for mining enterprises. Violation of the land surface by laying surface transport routes, construction of mining complexes, location of storage of minerals and rock dumps. Disturbance of the earth's surface during underground	4

Sections of the professional module, topics	Content of the training material	Hours
	mining and construction of underground facilities. Measures to reduce the scale of surface disturbance in mining. Reclamation of disturbed lands. Methods for studying the qualitative characteristics of the surface, soils and rocks.	
Total hours		56