


A photograph of a deep mine tunnel. The tunnel is dimly lit with warm, orange-toned lights. The rock walls are rough and uneven. In the center, there are several wooden support beams forming a truss structure. The perspective is looking down the length of the tunnel.

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SafeDeepMining

Advanced Rock Engineering
Education for Deep Mines



Advanced Rock Engineering for Deep Mines

Raw materials are essential for the production of a broad range of goods and applications used in everyday life. They are intrinsically linked to all industries across all supply chain stages. They are crucial for a strong European industrial base, an essential building block of the EU's growth and competitiveness. The future global resource use could double between 2010 and 2030.

(Report on Critical Raw Materials and the Circular Economy - Commission Staff Working Document SWD (2018) 36 final)

The Need for Rock Engineering Expertise in Deep Mines

Continuously growing demand for minerals and metals together with the exhaustion of shallow high quality mineral deposits have forced mining activities to progress deeper into the earth crust.

Today copper and nickel ore are mined at depths greater than 2 000 m below surface, whilst iron ore is being extracted at depth approaching 1 500 m and plans are well advanced to mine iron ore at depths of 2 000 m.

Mining activities at such depths are subjected to the effects of high rock pressures and rock temperatures. Excessive damage of mining excavations, increased rock fall hazard and rockbursts threaten the safety of mine workers, the economy of mining operations and the extraction of mineral deposits.

As far as the rock pressure aspects of deep mining are concerned, much progress has been made in the understanding of the mechanical behaviour of rock, the design and support of rock structures and stoping systems.

Tools to analyse the rock pressure situation in mines

have been developed, support systems to maintain the integrity of mining excavations under extreme rock pressure situations are available, and instrumentation to monitor stable and unstable rock deformation exist. The closure of many mining departments and research establishments in Europe and elsewhere at the turn of the century has had a major impact on the availability of highly qualified and trained personnel.

This situation has resulted (amongst others) in a severe shortage of rock engineering personnel required by mines, mining authorities, mining engineering consulting groups and universities to deal with the rock pressure problem encountered by many deep mines in a structured and professional manner.

(Galvin, J.M and Roxborough, F.: Back from the Brink. Report for Minerals Council of Australia (1996), Wagner, H. and Fettweis, G.B.L.: About Science and Technology in the Field of Mining in the Western World at the Beginning of the New Century. Resources Policy 27 (2001), 157-168.)



SAFE DEEP MINING

The Continuing
Education
Programme for
Advanced Rock
Engineering
Education
in the Mining
Industry

A photograph of a deep mine tunnel. The ceiling is covered in a dense network of steel cables and wires. The walls are rough and rocky, with some areas appearing to be reinforced with mesh. Several workers wearing hard hats and safety vests are visible, working on the tunnel. Bright lights illuminate the scene, creating a high-contrast environment. The overall atmosphere is industrial and somewhat claustrophobic.

WHO SHOULD ATTEND

To address the shortage of rock engineering personnel in the mining industry the European Institute of Innovation and Technology (EIT) Raw Materials has launched the continuing education programme “Advanced Rock Engineering for Deep Mines”.

This education programme is directed at mines, governmental organisations responsible for supervision of mining activities, consulting companies in the field of mining, having to deal with rock pressure problems, and personnel employed in the mining industry.

Entrance requirements are a suitable educational background, i.e. mining, geotechnical engineering, geology, mine surveying, or persons with extensive practical experience in the area of mine planning, mine support and supervision of mining activities in difficult ground conditions.

The two-year-programme is designed to enable participants to continue their work on the mines whilst undergoing the training in rock engineering for mines.

The Programme

The programme comprises eight compulsory and four elective modules, out of which the participants have to select three. The duration of the modules varies from one to two weeks.

The 17-month-course will be held in five blocks, each consisting of two to three modules with a duration of three to four weeks.

Between these course blocks intervals of three months will allow the participants to return to their normal work. During these they are expected to complete mine-specific assignments.

The programme is to be completed with a project work paper.

The emphasis of the education programme is on the application of rock engineering principles in the mining industry in order to make deep mining operations safer and more efficient.

It provides the participants with the basic knowledge and skills required to address and solve practical rock engineering problems.



Goals of the Programme

At the end of this programme the successful participant will be able to:

- » identify existing and likely future rock pressure problems;
- » analyse the problems in terms of the nature of the problem and suitable solutions;
- » develop solutions to eliminate or recognise the rock pressure problem;
- » train mining personnel to recognise hazardous rock fall situations and to take appropriate support measures;
- » select the correct support method and design of support system, or where required, develop and introduce new support systems;
- » evaluate mine design from a rock pressure point of view and, where or when necessary, modify or replace it with more appropriate designs;
- » evaluate the mining method from a rock pressure point of view and modify or change it where necessary;
- » examine the mining sequence and change it where necessary;
- » assist in the implementation of the proposed solution to the rock pressure problem;
- » design and implement appropriate instrumentation and monitoring systems;
- » determine and quantify the nature and magnitude of the rock pressure problem;
- » monitor the effectiveness of measures adopted to eliminate or minimise the rock pressure problem;
- » review the rock pressure situation on an on-going basis.
- » monitor the effectiveness of measures adopted to eliminate or minimise the rock pressure problem;
- » review the rock pressure situation on an on-going basis.

On completion of the programme the participants will be awarded the Academic Certificate for Rock Engineering in Deep Mines

(in accordance with the Austrian University Act 2002)



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Main Topics of the Programme

The programme comprises eight compulsory and four elective modules.

Compulsory modules:

1. Fundamentals of rock mechanics (2)
2. Rock mechanical lab testing (2)
3. Numerical modelling (2)
4. Field work and monitoring (2)
5. Ground support (2)
6. Rock engineering design in mines (2)
7. Mining induced seismicity - rock bursts general (1)
8. Management of rock pressure risk (1)

Elective Modules:

9. Management of rock burst problems in deep mines (1)
10. Rock engineering aspects in salt mining (1)
11. Rock engineering aspects in block caving (1)
12. Backfill in deep mines (1)

(Number in brackets indicate duration of modules in weeks)

Who will run the Programme

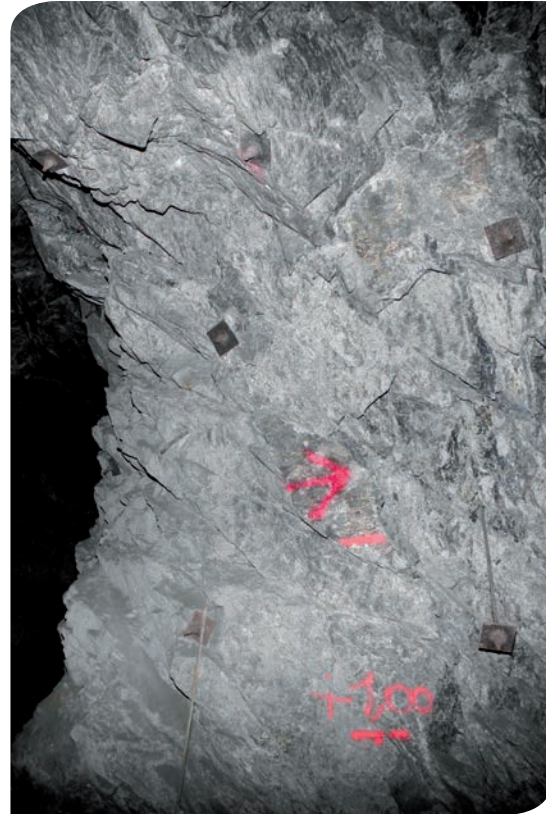
The "Advanced Rock Engineering for Deep Mines" programme is a joint effort by the following universities:

- » Montanuniversitaet (MUL),
Leoben, Austria (Consortium Leader)
- » Clausthal University of Technology (CUT),
Clausthal, Germany
- » Silesian University of Technology (SUT),
Gliwice, Poland
- » Technical University Bergakademie (TU-BAF),
Freiberg, Germany
- » University of Pretoria (UP)
Pretoria, South Africa

and the following other organisations and mines:

- » GEODATA Group: Supplier of monitoring hardware
and engineering services,
Leoben, Austria
- » KGHM Cuprum Ltd Research and Development
Centre, Poland
- » RHI Magnesita,
Breitenau, Austria
- » Wolfram Bergbau und Huetten AG,
Mittersill, Austria
- » ZAMG: Research Institute of the Austrian Federal
Ministry of Education, Science and Research, with
responsibility for weather forecasts and seismology,
Vienna, Austria

The individual modules will be run and administered by the universities responsible for the modules.



Fees

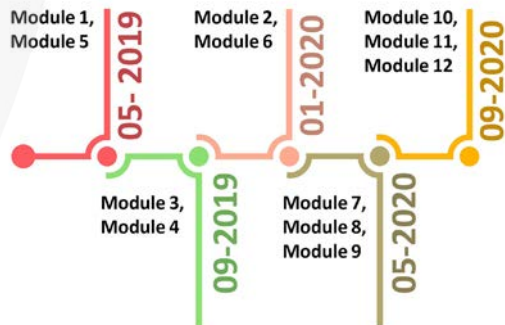
The fee for the initial two-year-course will be covered by EIT RawMaterials.

An organisational contribution of 1.000 Euros will be charged, covering costs of a comprehensive set of lecture notes, supervision of assignments, laboratory and field work, as well as refreshments during course work.

The rates for subsequent courses will be market-oriented.

Course Details

The first course takes place from May 2019 until September 2020.



Application

Applications should be submitted no later than 31.3.2019 to:

Ms Birgit Knoll

Chair of Mining Engineering
Montanuniversitaet Leoben

Franz Josef Strasse 18
8700 Leoben, Austria

Tel: +43 3842 402 6604

birgit.knoll@unileoben.ac.at

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A programme by:



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