OULU MINING SCHOOL

UNIVERSITY OF OULU

Oulu Mining School

Oulu Mining School (OMS) is a mining education and research unit integrating education and research in geosciences, geophysics, and mining engineering and mineral processing into the same entity. The aim is for students to have a comprehensive understanding of operations during the life cycle of a mine and to learn to communicate clearly with the entire operational network of the industry. As a result, the mining industry and its stakeholders can be served more comprehensively. In particular, research related to Arctic mining is a key topic in the school's activities and stakeholder collaboration. We operate in close collaboration with Nordic universities and other foreign universities.

The curricula of geosciences, geophysics, and mining technology and mineral processing have been developed to include the training of other specialised fields of the school. The courses take into account both the specialised expertise of the various fields as well as topics of the mining value chain that are relevant to economic and sustainable mining. Students can take advantage of the multidisciplinary approach of the University of Oulu.

Close cooperation with the industry is considered to be essential in OMS. Collaboration with working life is maintained and promoted in teaching, including through traineeships, visits to mines, field courses, and by benefiting from the know-how of visiting lecturers. OMS also organises tailored workshops for professionals who are already employed, in line with the theme of lifelong learning.

The international Master's programme, "Mineral resources and sustainable mining", covers both the degree programmes of the school. An international approach is featured strongly in Nordic Mining School, particularly as a result of the increasing collaboration with universities in the Arctic regions. Exchange students and trainees from around the world contribute to enlivening the study culture of OMS.

SAIJA LUUKKANEN

Professor
Head of the Unit
Oulu Mining School

The Erasmus Mundus Joint Master in Sustainable Mineral and Metal Processing Engineering - EMJM PROMISE is being established due to the awareness of increasing demands in the quantity and diversity of minerals, metals, and materials as we move towards renewable energy, electromobility, digital communication and other clean-energy technologies. PROMISE is the consortium involving the cooperation between four leading universities in mineral processing and mining engineering from Finland, Croatia, Austria and Chile.

The OMS Research Centre, which meets the requirements for safety and sustainable development, is a unique entity in the university world. It provides an excellent platform for teaching and research, not only for national but also for international partners, including universities, research institutes and representatives of the business community.

CONTENTS

OULU MINING SCHOOL

FutureSmart Mining™

Transforming the very nature of mining for a safer, smarter, more sustainable future.

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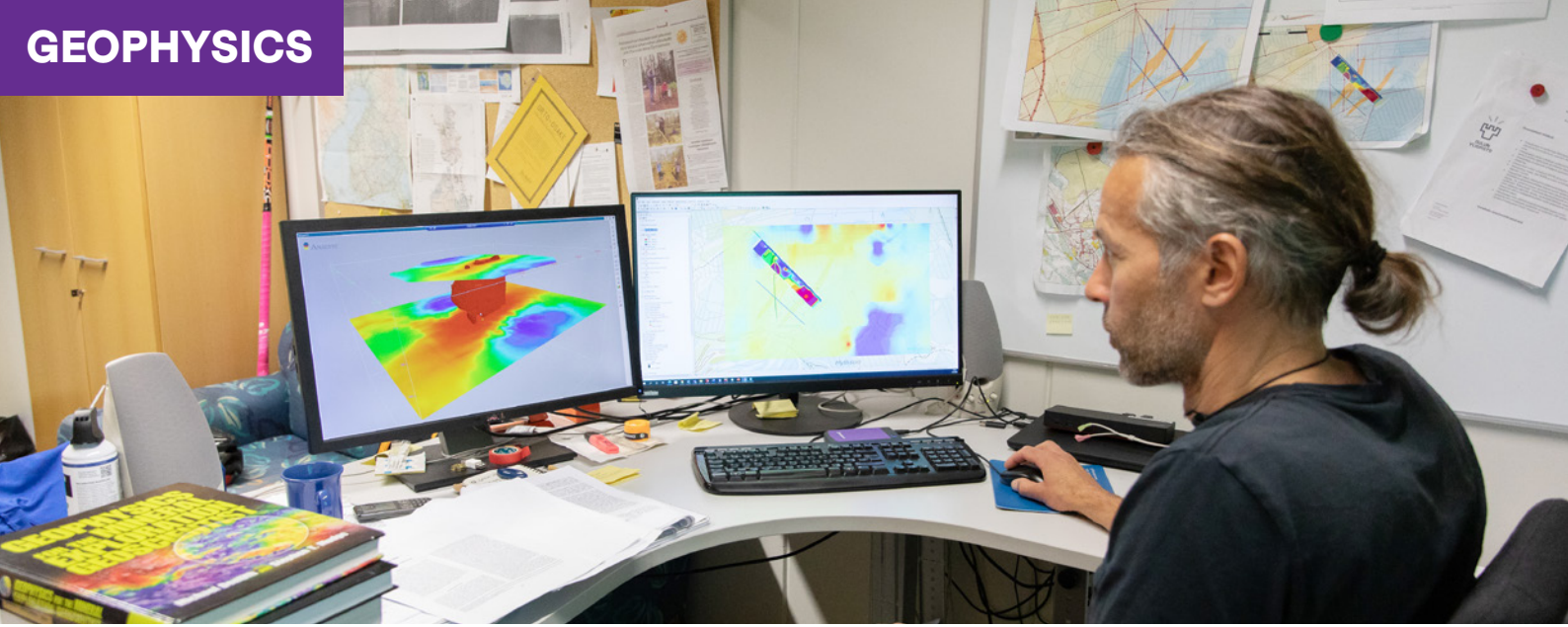


Applied geophysics

Geophysics is a natural science that involves the study of the physical structure and physical properties of the Earth and its surrounding space environment, as well as related physical processes. At the Oulu Mining School of the University of Oulu, teaching and research in geophysics focuses on applied geophysics, with emphasis on the use of geophysical methods (seismic, potential fields, electric and electromagnetic) in mineral exploration and mapping of natural resources, and in environmental, engineering and hydrological studies. In the life cycle of a mine, geophysics plays an important role before the opening the mine (mineral exploration and resource assessment), during mine exploitation and development (exploration for additional resources, safety of mining operations, underground and environmental monitoring), and after the closure of the mine (monitoring of mining waste, mapping of potentially contaminated areas).

Geological systems and mineral resources

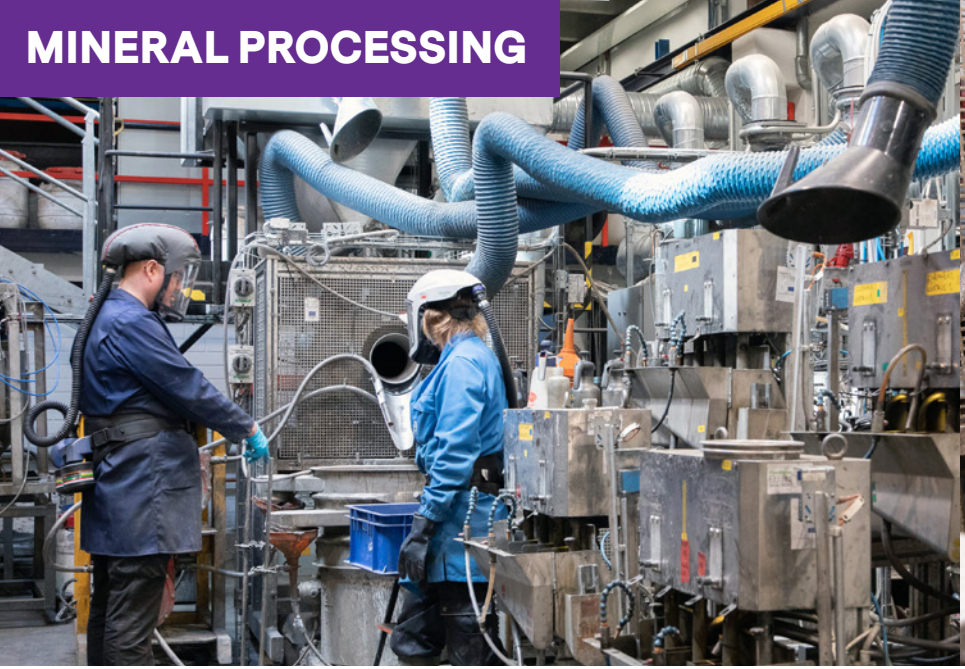
Research themes in the geosciences include studying the development of the Fennoscandian bedrock and the properties and origin of ores, as well as studies of glacial and stratification history and the groundwater of the northern regions of the globe. Research related to mineral resources covers magmatic Ni-Cu-PGE, Cr ores, and massive sulphide and orogenic gold deposits, along with critical metals, including lithium, cobalt and industrial mineral deposits. Mineral exploration is based on in-depth knowledge of the bedrock and soil in Fennoscandia. The research contribution from Quaternary geology comes particularly in the fields of glacial geology, stratigraphy and sedimentology, and global change research. Applied geochemistry research is related to exploration methods for ores in all geological environments, utilisation of groundwater and gravel resources, and studies related to environmental monitoring.

Mining engineering

Mining engineering applies mechanics, machinery technology, and the science in physics, materials science, chemistry, economics, artificial intelligence, and other disciplines, to extracting minerals from the earth. Research in mining engineering at Oulu Mining School covers mining systems, mining methods, rock drilling and boring, rock blasting, tunnelling, vibration reduction, rock support, rock mass classification, rock bursts and seismic events, mining safety, the mining economy, energy efficiency, and resource recovery. Mining brings natural minerals to the surface in a safe, efficient, and responsible way without causing undue disturbance to the environment, to satisfy societal and industrial needs, and to promote significant contributions to the economy. Mining engineering fosters engineers with sound fundamental technical and scientific multi-disciplinary knowledge, as well as practical skills in multidisciplinary teams.

Sustainable Arctic environment

In terms of natural resources and sustainable society, a key focus is on the exploitation of Arctic mineral resources and strengthening a supply of critical materials for the green transition. In this, international cooperation is becoming increasingly important. There is growing interest in the mineral resources and environmental change of the Arctic. New research methodologies and a better understanding of the geological development of the Arctic will become increasingly central to our area of expertise, and the need for this information will further grow in the assessment of new ore resources. When using new methods of analytics and data management, it is possible to narrow down critical geological areas and optimise the exploitation of Arctic mineral resources in a sustainable way. This includes activities from environmentally friendly exploration and mineral processing, as well as environmentally and societally acceptable mining operations.



Mineral Processing

The main research themes are focused on energy efficient processing, water management, dry processing, tailings management and processing of secondary raw materials and process optimization (modelling, advanced process control and AI). The major energy consumption in mining is related to rock breakage: crushing and especially grinding. Innovative solutions for more energy efficient comminution have already been designed by the team members and will further be developed.

Water is an issue in many big mining countries and research related to more efficient process water management and dry processing are among the research interests in the OMS Mineral processing team and is done in collaboration with other units of University of Oulu and external partners. Moreover, research is focused in processing of critical minerals and metals which supply is critical for the increasing world wide's demand and requirement for clean technologies.

www www.oulu.fi/en/apply/masters-mineral-resources-and-sustainable-mining

www www.master-promise.eu

Master's programme and Erasmus Mundus Joint Master

A two-year Master's programme is an exciting opportunity to study Mineral Resources and Sustainable Mining, either in geosciences or mining engineering, in an excellent infrastructure and with a close connection to the mining industry. These programmes are among the few in the world to cover the whole mining value chain from exploration to mining, concentration, refining, and closure.

The Erasmus Mundus Joint Master in Sustainable Mineral and Metal Processing Engineering is about the awareness of increasing demands in the quantity and diversity of minerals, metals, and materials. This scholarship is a cooperation between four leading universities in mineral processing and mining engineering from Finland, Croatia, Austria and Chile.

Life-long learning

Oulu Mining School offer courses in geosciences, mineral processing, mining engineering, and applied geophysics within the open university and life-long learning framework of the University of Oulu. This framework allows professionals to widen their knowledge in a specific field or with a wider perspective in the field of interest.

In addition, OMS is collaborating with a wide range of industrial and academic partners to design and implement education export in Finland and abroad.

RESPONSIBILITY FOR A GOOD FUTURE

AGNICO EAGLE
FINLAND

We succeed hand in hand with the people of Lapland. That is why we invest strongly in the entire community — our employees, the many stakeholders, and our region. We have grown important to each other.

WE ARE COMMITTED TO CREATING A BRIGHT FUTURE TOGETHER ALSO IN THE COMING DECADES.

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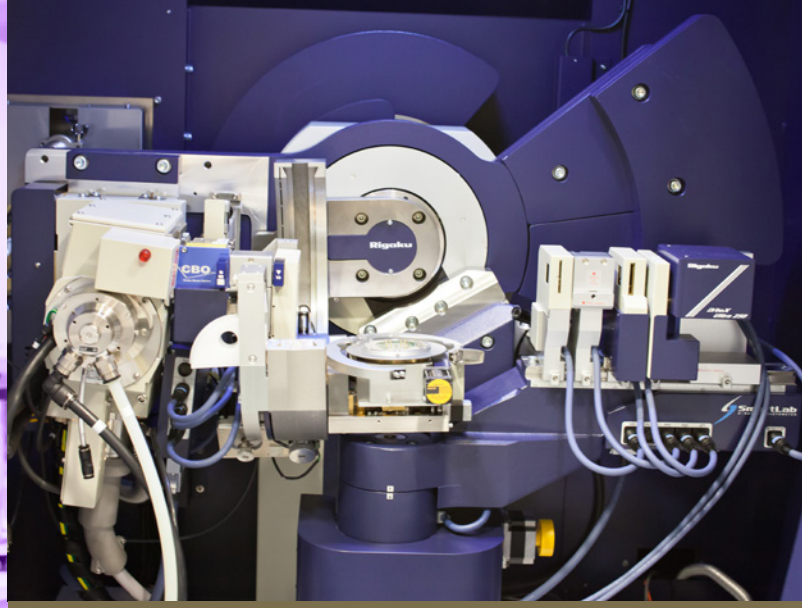
Oulu Mining School Research Center

Oulu Mining School Research Centre, at the University of Oulu, invests in, maintains, and continuously develops a research environment and services for companies and other organisations linked to the mining industry, from exploration to mineral processing and waste management.

We support sustainable development and the circular economy, especially in the Arctic mining environment, with the only mining-specific university-based research unit in Finland. Our unique continuous and automated pilot plant is ideal for cooperation with the mining and technology industry and academia. We provide open access services in mineral exploration, geochemistry, mining engineering and rock mechanics, and mineral processing, with a focus on comminutions, continuous flotation, analytics, monitoring and optimisation, simulation, water treatment, and waste management.

FinnMin

Finnish Mining Association



Watch the video on Oulu Mining School Research Centre.

With our experts, you can make quick analyses of geochemical and mineralogical samples, and test new methods and equipment. You can also get training courses and hands-on learning experiences in our industrial environment.

Services of the Oulu Mining School Research Centre

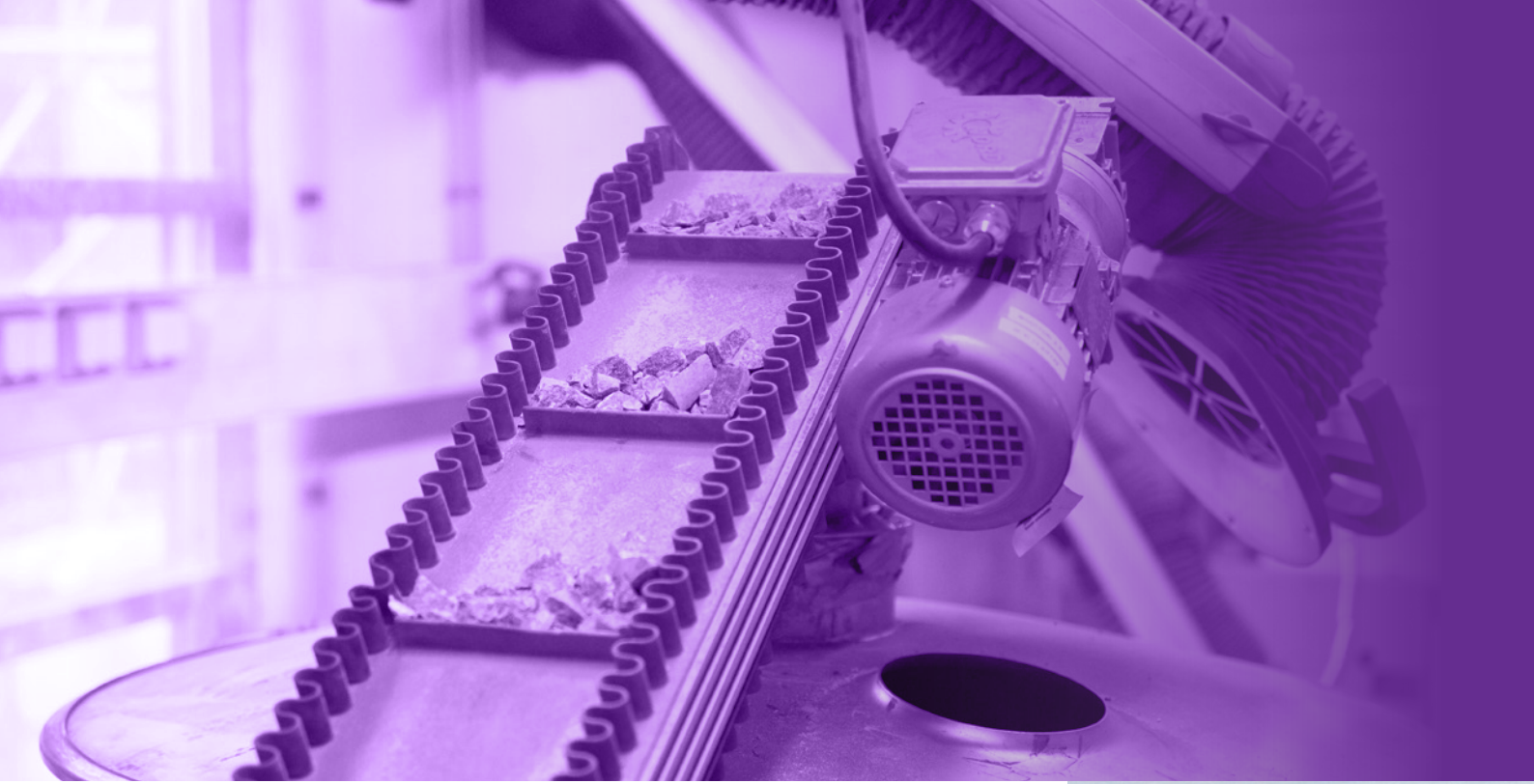
We utilise a varied selection of equipment in our education and research related to mining. We offer a modern infrastructure for the extensive processing of materials and the opportunity to perform rare explosion studies as the only university in the world.

We utilise a varied selection of equipment in our education and research related to mining. We offer a modern infra-structure for the extensive processing of materials, the rare opportunity to perform explosion studies and a continuous floating concentration plant as the only university in the world.

Mining and technology industries, research organisations and other universities are some of the entities utilising our services. Contact us for more information!

Read more:
www.oulu.fi/en/university/faculties-and-units/faculty-technology/oulu-mining-school

- Geochemical services
- Mining engineering services
- Leaching and flotation laboratory services
- Minipilot services
- Sample preparation
- Educational services



SULZER

Proven solutions for pumps and mixers in the mine water industry

Sulzer offers a comprehensive portfolio of pumps and process equipment for abrasive and corrosive environments in mine applications. Mine operations are harsh environments with slurries and water which contain abrasive and corrosive liquids. Mine water and slurry management is characterized more as an application-based segment rather than a process-oriented one. Applications can be divided into various slurry handling, dewatering, water intake, supply of process water and water treatment.
sulzer.com**/en/shared/applications/mining**

Oulu Mining Summit

The Oulu Mining Summit aims to build a platform for mining companies, universities, research institutes, and mining-related enterprises. The purpose of the summit is, first, to disseminate up-to-date science and technology covering the whole chain from geology and geophysics to mining engineering and mineral processing; second, to present successful examples from mining or mining-related industry; third, to exchange knowledge, experiences, and ideas; and fourth, to discuss the current challenges in mining and mining-related fields.

The summit is organised by Oulu Mining School in cooperation with Business Oulu. You can find the date and details of the next summit on our website.

OULU MINING SUMMIT 2016–

2016 · Mineral Processing

2017 · Mineral Exploration in Finland

2018 · Mining Engineering

2019 · Geophysics

2020 · Sustainable Mining in Arctic

2021 · Sustainable practices in mineral exploration and research in the Arctic

2022 · Mineral Processing

ProKaivos – a central resource for news and jobs

ProKaivos is a Finnish web service for mining and technology industries offering news and unbiased information about the extractive industry, companies operating in it, job opportunities and events.

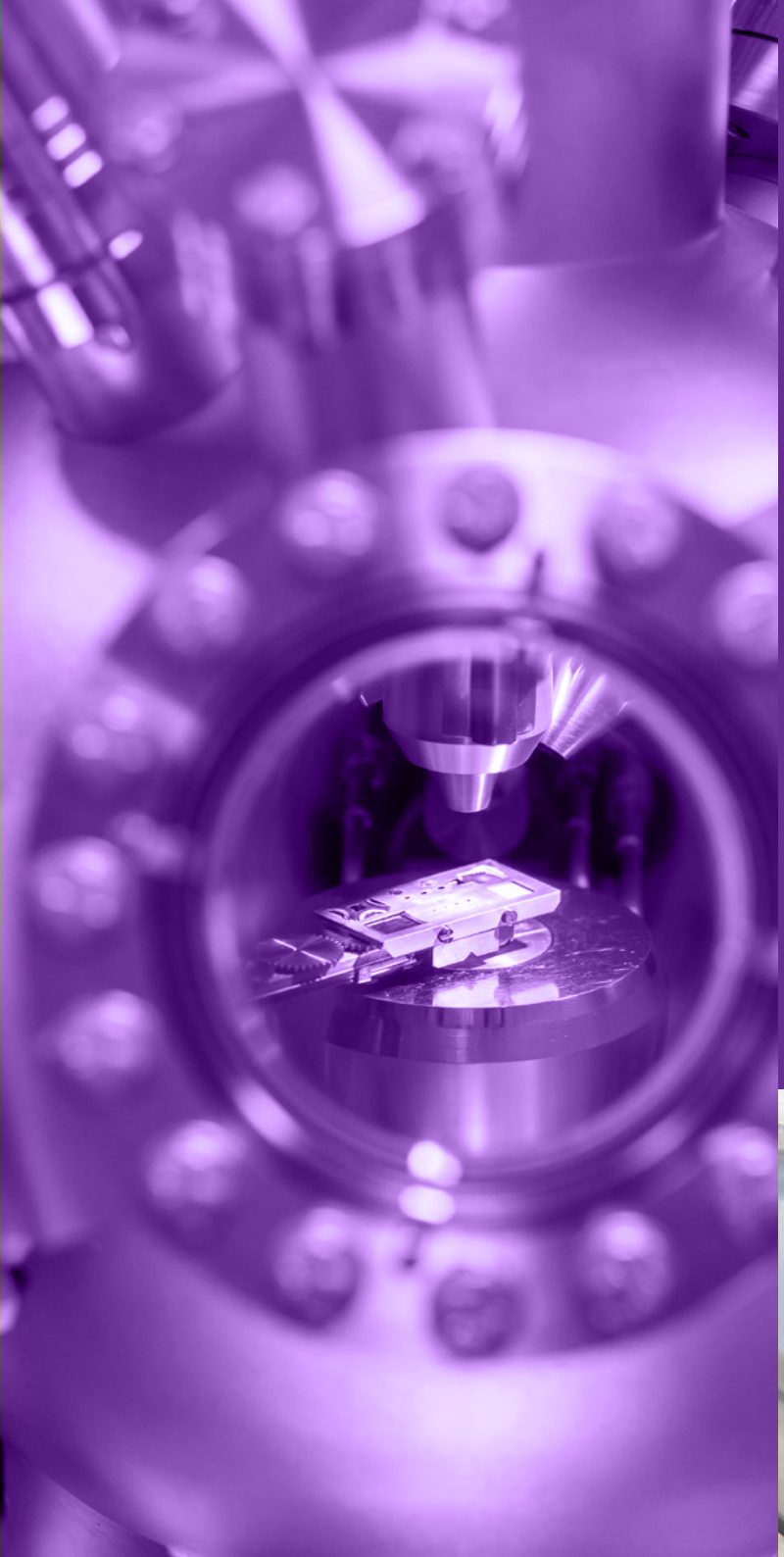
The site also includes an extraction industry company register, provided free of charge. ProKaivos works in collaboration with the Finnish Mining Association. It is administered and maintained by Oulu Mining School, the mining education and research unit of the University of Oulu.

SUOMEKSI

Oulu Mining School

Oulun yliopiston kaivannaisalan yksikkö (Oulu Mining School, OMS) on kaivannaisalan opetus- ja tutkimusyksikkö, joka integroi geotieteiden, geofysiikan sekä kaivos- ja rikastustekniikan opetuksen ja tutkimuksen samaan kokonaisuuteen. Hyödynnämme opetuksessa Oulun yliopiston monitieteisyyttä ja teemme tiivistä koulutusyhteistyötä pohjoismaisten yliopistojen ja muiden ulkomaisten yliopistojen kanssa.

Läheinen yhteistyö teollisuuden kanssa on OMS:ssa ensiarvoisen tärkeää. Työelämäyhteistyöhön kuuluvat muun muassa harjoittelujaksot, kaivosvierailujen ja kenttäkurssit. Järjestämme myös räätälöityä koulutusta jo työelämässä oleville osaajille elinikäisen oppimisen teeman mukaisesti. Keskeinen aihealue yksikkömme toiminnassa ja sidosryhmäyhteistyössä on arktiseen kaivostoimintaan liittyvä tutkimus.



Oulu Mining School Tutkimuskeskus

Oulu Mining School Tutkimuskeskuksella (OMSRC) on käytössään monipuolinen valikoima laitteistoja kaivannaisalan koulutuksen ja tutkimuksen tarpeisiin. Tarjoamme modernin alustan laaja-alaiseen materiaalien käsittelyyn ja mahdollisuuden harvinaisten räjäytystutkimusten tekemiseen ainoana korkeakouluna maailmassa. Palveluitamme hyödyntävät esimerkiksi kaivos- ja teknologiateollisuus, tutkimusorganisaatiot ja muut yliopistot.

www **Tutustu palveluihimme:**

www.oulu.fi/fi/yliopisto/tiedekunnat-ja-yksikot/teknillinen-tiedekunta/kaivannaisalan-yksikko/oulu-mining-school-tutkimuskeskus

OULU MINING SCHOOL

Head of the Unit · Professor Saija Luukkanen · saija.luukkanen@oulu.fi · +358 50 465 2982

Check all our contact details: www.oulu.fi/fi/yliopisto/tiedekunnat-ja-yksikot/teknillinen-tiedekunta/kaivannaisalan-yksikko

OULU – A HIGHER GRADE OF ROCK

BUSINESSOULU SUPPORTS ECONOMIC GROWTH OF THE OULU REGION MINING INDUSTRY

Mining industry provides significant business opportunities in the Northern Finland. There are currently over 100 companies in the region operating in mining industry and providing services directly for mining industry.

Cooperation between BusinessOulu, regional companies and educational and R&D institutions focuses on:

- increasing mining industry investment potential
- building national and international networks and partnerships
- developing mining industry clusters
- promoting and improving IoT and digitalization for the benefit of mining industry

Contacts:

Olli Löytynoja
Head of Key Accounts and Investments
+358 400 340 028
olli.loytynoja@businessoulu.com

Eija Hämäläinen
Coordinator
Cleantech and Industry
+358 40 703 5761
eija.hamalainen@businessoulu.com

oulu.com | businessoulu.com

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