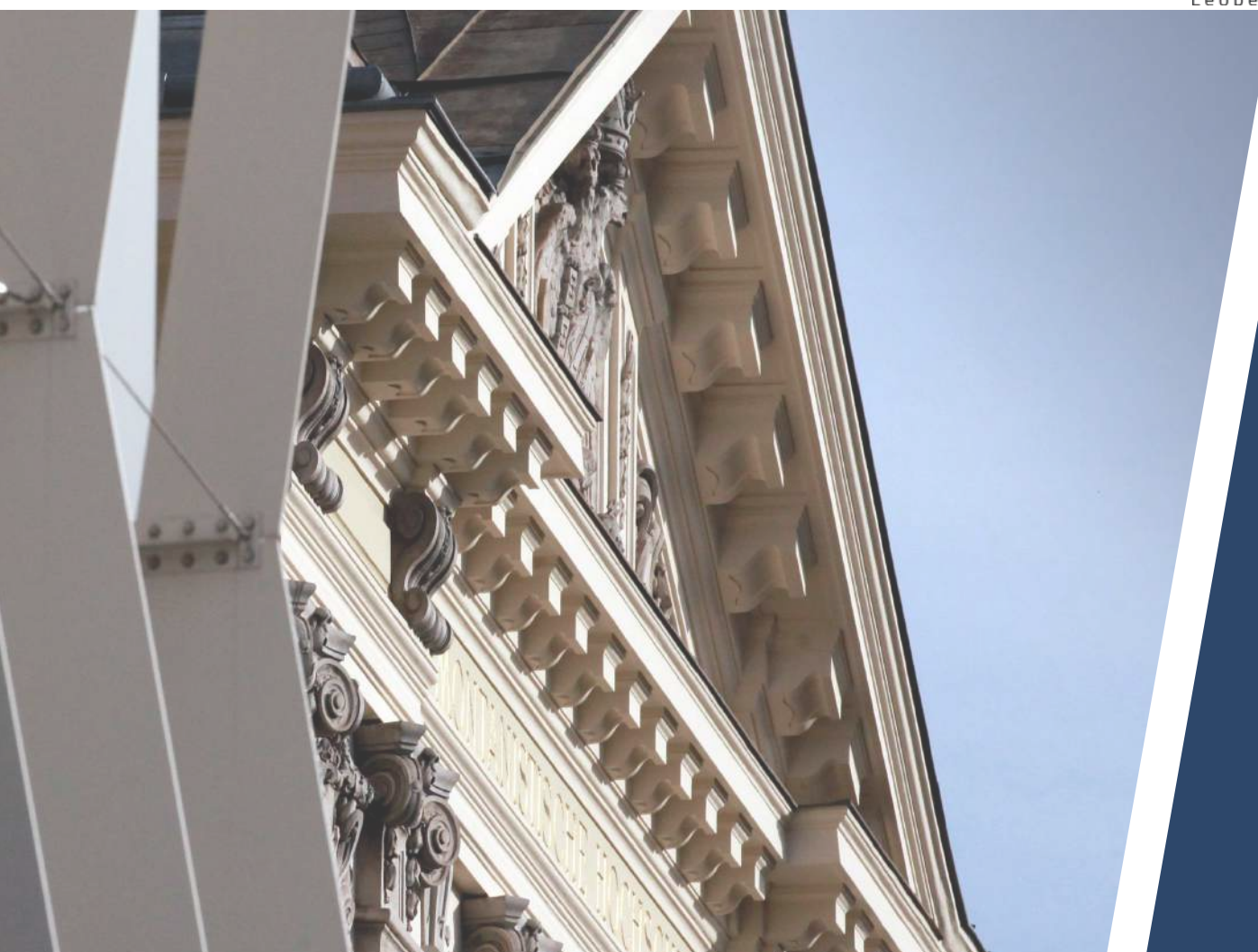


INTERNATIONAL COMPETENCE CENTRE FOR MINING-ENGINEERING EDUCATION UNDER THE AUSPICES OF UNESCO



AUSTRIAN BRANCH
AT MONTANUNIVERSITÄT LEOBEN



LEOBEN

INTERIM REPORT FOR
THE ACTIVITIES OF THE FIRST HALF YEAR

2021A



IMPRESSUM

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MESSAGE FROM THE DIRECTOR



The core mission of **Montanuniversität Leoben** is to produce new knowledge to contribute to the fruitful and sustainable development of society. In this context, we are particularly proud to be part of the **International Competence Centre for Mining-Engineering Education under the auspices of UNESCO network**.

Our Centre for Mining Education UNESCO is a platform where practitioners, professors, researchers, students, universities, companies and policymakers come together **dedicating their efforts** to education, research and work with young people and professionals for a sustainable tomorrow; the ultimate goal is the contribution to the achievement of the United Nations Sustainable Development Goals (SDGs) with regard to the mineral resources and mining sector, supplying mankind with affordable raw materials produced in a responsible way.

In this context, the Austrian branch of the centre was happy to deliver a variety of activities during the first half year of 2021 in the areas of **international cooperation, education, research, mobility, events and marketing**, setting actions to achieve this endeavour.

With this document, my team and I would like to present our work and activities from 1st January to 30th June 2021.

Dear reader, we are grateful that you are part of this shared work and hope you enjoy reading this report.



Peter Moser, Vice-Rector for International Relations of Montanuniversität Leoben

MESSAGE FROM THE SECRETARY-GENERAL



After successfully completing the first year of operations of our institution, we were glad to start our second year of operations with real highlights; such as the continuation of the **online lecture series** “Sustainable Development Approaches in Engineering Research and Education” with more than 300 individual registrations, or the organisation of a **climate conference** within the framework of the civil society forum Sochi Dialogue.

As an international organisation in the midst of a global pandemic, our work has been dominated by the development of state-of-the-art online education formats and the building of new relationships via Zoom, Webex and co.

Despite the significant challenges – which were transformed into opportunities – we delivered on a number of activities within our strategic priorities including:

- Education,
- Mobility,
- Public outreach, and
- the development of a research agenda.

We are all the more pleased that we have also deepened our partnerships and expanded our network. In this context, we would like to warmly welcome our longstanding partner TU Bergakademie Freiberg to the organisation as the German branch.

The entire team of the Austrian branch is looking forward to exciting new activities in the second half of 2021.



Anna Voica, Secretary-General and Communications & Partnership Manager

1. INTRODUCTION TO THE AUSTRIAN BRANCH

ABOUT US



From left to right: Rector Eichlseder, Vice-Rector Moser, Rector Litvinenko at the signing ceremony of the Austrian branch

Montanuniversität Leoben has been cooperating successfully with Saint Petersburg Mining University for more than 15 years.

This cooperation culminated in December 2019 in the foundation of the Austrian branch of the International Competence Centre for Mining-Engineering Education under the auspices of UNESCO at Montanuniversität Leoben (MUL).

The Austrian branch operates on a global mandate with a specific focus on Europe and Austria and has given priority to the topics of sustainability, the global supply of raw materials and raw materials policy.

From our perspective, international cooperation, working across borders and disciplines are the most important ingredients for developing innovative solutions and new ideas for the sustainable development of society globally.

This is why we are very proud to be a major partner in this global raw materials initiative dedicated to education, research and work with young people.

In general terms, the headquarters of the International Competence Centre for Mining-Engineering Education under the auspices of UNESCO at Saint Petersburg Mining University (SPMU), established in March 2018, is a category II centre of the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

These centres and institutes form a vast network of associated centres in the fields of water, renewable energy, science policy, biotechnology, geosciences, the basic sciences and remote sensing.

Furthermore, through capacity building, the exchange of information in their particular discipline, theoretical and experimental research and advanced training, they provide a valuable contribution to the implementation of UNESCO's strategic programme objectives and actions in education, sciences, culture and communication at the global, regional and national levels.



From left to right: Rector Eichlseder, Rector Litvinenko, Vice-Rector Moser at the signing ceremony of the Austrian branch

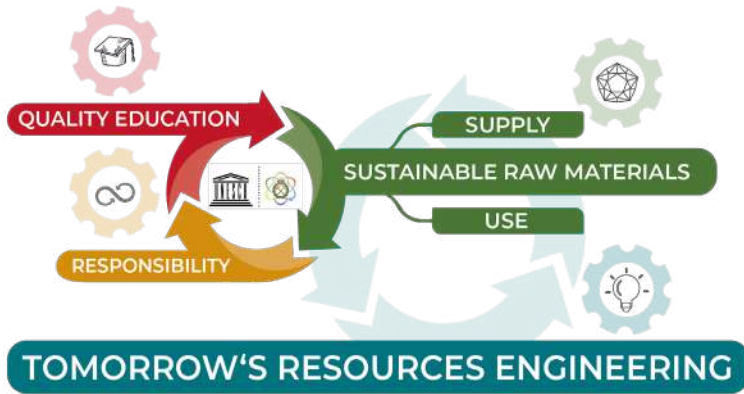
CONTEXT OF OUR WORK

Society is currently facing a series of major challenges, one of the most important being the drastic global population increase and simultaneous economic growth of developing nations. Additionally, a technological and energy revolution is looming at the global doorstep.

All of this brings with it a mineral intensity in a high volume and variety. This leads to the fact that in addition to the visionary concept of the low carbon circular economy, the supply of mineral raw materials from primary resources is needed to cover the increasing demand.

Therefore, our task is to develop new innovative solutions for the careful extraction and efficient use of primary resources and the recovery of minerals from secondary sources.

In order to do so, we create conditions for the education of resource engineers within the framework of new international study programmes as well as the continuing education of qualified personnel in mining engineering. In addition to that, we create favourable conditions for the global mobility of students, post-graduate students, teachers and scientists.



Another focus of our centre is on research and development activities for the efficient and environmentally friendly use of resources.

OUR MISSION

Our mission is to educate today's engineers for a sustainable tomorrow.

This goes hand in hand with the promotion and support of UNESCO's overarching objective of sustainable development at the national and international levels with regard to the mineral resources and mining sector. Our work is related to the following Sustainable Development Goals (SDGs):



SDG 4- Quality Education



SDG 12- Responsible Consumption and Production



SDG 7- Affordable and Clean Energy



SDG 13- Climate Action



SDG 9- Industry, Innovation and Infrastructure



SDG 17- Partnerships for the goals

The particular aims of the mission are:

- Creation of conditions for excellence in education and the continuous education of qualified specialists;
- Creating favourable conditions for the global mobility of students, post-graduate students, teachers and scientists;
- Development of an international network of researchers working around the topic of sustainable raw material supply from primary and secondary resources;

WHO WE ARE

Alongside of the rector of Montanuniversität Leoben, as head of the Austrian branch, the acting team comprises the following dedicated and ambitious members:

VICE-RECTOR PETER MOSER



Position: Director of the Austrian Branch

Tasks: Department strategy – strategic development of new education and research programmes with the headquarters in Saint Petersburg; development of relations with the global mining community; contacts with Austrian and European raw materials-related institutions.

Peter Moser is a professor at Montanuniversität Leoben. Since 2008, he has headed the Chair of Mining Engineering & Mineral Economics. In 2011 he was appointed vice-rector, responsible for international affairs and university infrastructure. Through his very active involvement in the European raw materials landscape, such as in the European Innovation Partnership on Raw Materials High Level Steering Group or as a steering committee member in the EIT RawMaterials community, his research and devotion currently revolve around the societal challenges regarding the sustainable raw materials supply of Europe and the globe. Professor Moser speaks German, English and intermediate French.

SUSANNE FEIEL



Position: Head of the International Department and Resources Innovation Center

Tasks: Department strategy – coordination of the access of the Austrian branch to Austrian and European sustainability and research networks.

Susanne Feiel has a degree in English studies and is currently enrolled in the PhD programme at TU Bergakademie Freiberg (Germany). She is the head of the Departments RIC (Resources Innovation Centre) and MIRO (Montanuniversität International Relations Office). Her vision is a comprehensive internationalisation of the university through long-term, stable and qualitatively strong partnerships with other universities. Her areas of focus are education, the creation of visibility for the raw materials sector as well as initiatives for sustainable development, material flow management and climate action in order to promote the development of responsible resource consumption and responsible production. Susanne Feiel speaks German and English and upper intermediate French, Italian and Spanish.

ANNA VOICA



Position: Secretary-General & Communications and Partnership Manager

Tasks: Coordinator of operations department administration, partnership management, coordination of the Austrian branch's participation in the development of activities, marketing and public outreach strategy,

Anna Voica studied law and mediation. Pursuing her interest in international relations and cooperation, she studied at the Diplomatic Academy in Vienna for one year. She worked as a liaison officer at the Austrian Presidency of the Council of the European Union in 2018, where she could apply and deepen her knowledge of diplomacy and international relations. In addition to her mother tongues German and Romanian, Ms. Voica speaks English and upper intermediate French. Currently, she is studying Russian.

ANASTASIA KUCHERYAVAYA



Position: Department Operations – Scientific Coordinator

Tasks: Development and implementation of the Austrian branch’s joint research and academic activities including the coordination of joint scientific programmes, course design and the promotion of the principles of the UNESCO Competence Centre for Mining-Engineering Education to a broader audience.

Anastasia Kucheryavaya obtained her Master’s degree with honours in Ceramics and Refractories at D. Mendeleev University of Chemical Technology of Russia. Afterwards, she worked in research & development in the refractory industry in Austria, Italy and Russia for seven years, gaining experience in project management and as a production and quality development manager. In 2021, she was awarded her doctoral degree with distinction at Montanuniversität Leoben. Besides her mother tongue Russian, she speaks English, German and

MARIA THERESA TRETTLER

Position: Department Operations- Education Portfolio Development and Organisational Support



Tasks: Development of an education portfolio including courses and summer schools, marketing design.

Maria Theresa Trettlér is an active mining engineering student at Montanuniversität Leoben. After finishing her studies, she will specialise in sustainable and green mining.

Because of her knowledge of the university’s structure and the students’ interests, she actively works on the implementation of activities that are highly welcomed by students: for example, she promotes the integration of topics like environmental protection and sustainability into the daily education of future mining engineers.

She also co-developed the corporate design of the Austrian branch and supports the organisation and holding of events. Ms. Trettlér speaks German and English and is currently studying Russian.

JULIA BRANDL



Position: Event Management, Communications and Organisational Support

Tasks: Organisation and hosting of offline and online events, marketing and social media.

Julia Brandl is an active mining engineering student at Montanuniversität Leoben. After finishing her studies, she will specialise in raw materials processing.

She manages the Austrian branch’s social media presence to promote the principles of the sustainable supply of raw materials to a broader audience. Ms. Brandl also helps coordinate the participation of students and young researchers in international events of our partners, for example the Sochi Dialogue and the online Forum-Contest for Young Researchers.

She speaks German, English, Portuguese and is currently studying Russian.

2. PARTNERS & PARTNERSHIP MANAGEMENT

Establishing a global network of excellence is of utmost importance to us. These are the partners we work with to achieve this endeavour:

MIRO - ADMINISTRATIVE SUPPORT FOR INCOMING AND OUTGOING STUDENTS AND RESEARCHERS



Montanuniversität International Relations Office (MIRO) is a service facility which provides support to the Austrian branch in the application for, review and coordination of mobility programmes along with its processes regarding incoming and outgoing mobilities.

More specifically, MIRO supports prospective international students and researchers as well as their hosting institutes before their arrival, during their stay and up to their departure with information on visa and residence titles, accommodation, administrative issues, health insurance and everyday life in Leoben.

MIRO aims to provide a high quality of support and services, helping future students and researchers grow into a vibrant community, and ensuring they feel comfortable and prepared to study and live in Leoben.

MIRO's Services:

Providing information before and during the stay on the following topics:

- Immigration (visa and residence titles in Austria)
- Finding accommodation in Leoben
- Registration at the university
- Austrian health insurance system
- Residence registration with the city of Leoben
- Doctors who speak English or other languages
- German courses, activities & events



Students enjoying their break

Please find further information at: <https://international.unileoben.ac.at/en/>

RIC - SUSTAINABILITY AND RESEARCH NETWORKS



The Resources Innovation Centre Leoben (RIC) at Montanuniversität Leoben is home to the international partnerships of the university in the areas of sustainable science, education and industrialisation and serves as a platform for the interdisciplinary linking of the institution's expertise for integration into large-scale projects.

RIC Leoben coordinates activities within the partner networks, namely:

- EIT RawMaterials: Knowledge & Innovation Community (KIC) of the European Union in the mineral raw materials sector;
- EIT Climate-KIC: Knowledge & Innovation Community of the European Union in the areas of urban transition and sustainable production systems to foster a climate-resilient society;
- UniNetz: Implementation of the United Nations Sustainable Development Goals in the Austrian higher education sector through a joint network project of all universities;
- Climate Change Centre Austria: Coordinating body for the promotion of climate research in Austria.

The RIC is especially active in the area of education and in the strategic focus areas of the EIT RawMaterials. In particular, RIC Leoben works on projects in the areas of education, sustainable exploration & mining, technological innovation and recycling and is an active partner in terms of strategic development of the community.

RIC is also a member of the EIT Climate-KIC, another KIC that is working with its activities on accelerating the transition to a zero-carbon, climate-resilient society through innovation and human development.

Another pillar at RIC Leoben is sustainable development, in which we are committed to achieving the United Nations Sustainable Development Goals through various initiatives. One of the key activities in this respect is the implementation of the goals in the Austrian higher education sector through a joint network project of all universities.

All of RIC's activities are interlinked and complementary in that the results to be achieved are all aimed at sustainable innovation in the resource sector for a better future.

Please find further information at: <https://ric-leoben.at/>

Through its close cooperation with RIC, the Austrian branch is provided with the opportunity to access relevant European and Austrian networks in the raw materials sector.

Furthermore, activities are developed and implemented with our core partners:

SPMU - SAINT PETERSBURG MINING UNIVERSITY

Montanuniversität Leoben and Saint Petersburg Mining University have been cooperating for more than 15 years in the field of research and education. Together with major companies in the fields of mining, processing and construction, exchange programmes have been established. Recently, a new exchange programme under Erasmus+ has been launched. Professors, researchers and students meet regularly to exchange views and ideas on future sustainable mining and processing technologies.



Please find further information at: <https://en.spmi.ru/>

TUBAF - TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG

Cooperation between TU Bergakademie Freiberg (TUBAF) and Montanuniversität Leoben goes back to as early as the 19th century. Many joint education and research projects are the basis for a lively cooperation. We are all the more pleased that this year, we are welcoming TUBAF as the German branch in the network of the Centre for Mining Education UNESCO and they have already taken up our invitation to participate and share their expertise in our online lecture series.



Please find further information at: <https://tu-freiberg.de/>

LUT - LAPPEENRANTA-LAHTI UNIVERSITY OF TECHNOLOGY

LUT University is the Finnish flagship centre within the network of the Centre for Mining Education UNESCO. LUT brings in their expertise, for instance, in separation technology, waste management and circular economy involving mineral resources.



We are happy to have further deepened the cooperation between LUT and MUL, through LUT's participation in our online lecture series.

Please find further information at: <https://explorer.fi/en/> and <https://lut.fi/tu>

EIT RAW MATERIALS



Montanuniversität Leoben is one of the founding members of EIT RawMaterials, a knowledge and innovation community in the field of mining, processing and recycling. In addition, the development of new, more sustainable materials and the substitution of critical raw materials are a focus of the EIT RawMaterials community. Every year, around 50 research projects with a financial volume of around €100 million are carried out.

Please find further information at: <https://eitrawmaterials.eu/>

EURECA-PRO - EUROPEAN UNIVERSITIES



European Universities is one of the flagship initiatives of the EU's ambitions to build a European Education Area. MUL is a project leader for the successful Erasmus+ project "EURECA-PRO – The European University Alliance on Responsible Consumption and Production." The Austrian branch of the Centre for Mining Education UNESCO has joined and supports this project as an associated partner.

Please find further information at: <https://www.eurecapro.eu/>

SOCHI DIALOGUE



The Sochi Dialogue is an Austrian-Russian civil society forum that aims to strengthen bilateral relations and civil society exchange between Austria and Russia as a regularly meeting discussion platform and address current civil society issues and developments. We are pleased to be jointly organising a large-scale climate conference called "Reflections on responsible raw materials supply for sustainable development" in August 2021.

The strategic, non-political meeting of leading experts in the field of ecology will become a platform for discussing crucial issues on responsibly produced raw materials as a basis for achieving the UN Sustainable Development Goals (SDGs), future sustainable energy supply and mitigating climate change.

Please find further information at (available in German and Russian): <https://sochidialog.com/>

UNESCO GEOPARK STYRIAN EISENWURZEN



UNESCO Global Geoparks are single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development. In 2015, the Styrian Eisenwurzten Nature Park was recognised as a UNESCO Global Geopark as part of the UNESCO World Heritage. We are happy that the CEO of UNESCO Geopark Styrian Eisenwurzten accepted our invitation to participate in our online lecture series and share their expertise.

Please find further information at : <https://www.eisenwurzten.com/>

MiReBooks

MiReBooks produces a series of virtual & augmented reality-based interactive mining handbooks as a new digital standard for higher mining education across Europe. This project sets a new digital standard for higher mining education throughout Europe.



With MiReBooks, the way of teaching will change, as instructors will be able to engage their students in a more effective way and offer them an enriched content repertoire as well as an increased comprehension opportunity.

The array of possible industrial mine environment examples that students can be immersed in becomes endless, so the industry will receive graduates that are familiarised in-depth with a holistic view in an industrial context.

We are happy that the project coordinator of MiReBooks accepted our invitation to participate in our online lecture series and share their expertise.

Please find further information at: <https://mirebooks.com/>

ESF

“Engineers for a Sustainable Future” is an association founded by students and graduates of Montanuniversität Leoben. Its objective is to raise awareness and educate regarding climate protection and sustainability in engineering and heavy-industry related fields and to promote active, voluntary, extra-curricular student engagement.



We are happy that ESF took up our invitation to participate in our online lecture series and share their expertise on sensitising young engineers to the topics of environmental protection and sustainability by showing the consequences of their decisions in technical professions.

Please find further information at: <https://www.esfuture.at/>

RUSSIAN EMBASSY IN AUSTRIA

Students and researchers from Russia can find their home in Austria for a semester or a longer period of time. They can also find their home away from home at the Embassy and Consulate of Russia in Vienna. The Austrian branch has established contact with the embassy, reinforcing the partnership between Montanuniversität and Russian students and scientists in Leoben. A special focus of the Centre for Mining Education UNESCO is the popularisation of mining engineering among the young generation. Before graduation, pupils at the Russian Embassy School received informational brochures about Montanuniversität Leoben. We hope to have sparked their interest in engineering sciences and greet them soon as first year students in Leoben. Starting from September 2021, classes are planned in person, and the Austrian branch’s scientific coordinator Anastasia Kucheryavaya is already busy preparing several excursions for Russian pupils to the mines in Styria and to various laboratories at the university in Leoben. We are looking forward to the fruitful collaboration and exciting educational experience together with the Embassy and Consulate of Russia.



3. HIGHLIGHTS

SOCHI DIALOGUE - CLIMATE CONFERENCE



The Sochi Dialogue is an Austrian-Russian civil society forum that aims to strengthen bilateral relations and civil society exchange between Austria and Russia as a regularly meeting discussion platform and address current civil society issues and developments.

The forum, in partnership with the UNESCO Mining Education Centre network represented by St. Petersburg Mining University (headquarters) and Montanuniversität Leoben (Austrian branch), will hold a large-scale climate conference called “Reflections on responsible raw materials supply for sustainable development.” The Trianon Dialogue (France) and the Petersburg Dialogue (Germany) are also collaborating as partners of the conference.

The strategic, non-political meeting of leading experts in the field of ecology will become a platform for discussing crucial issues on responsibly produced raw materials as a basis for achieving the UN Sustainable Development Goals (SDGs), a future sustainable energy supply and mitigating climate change.



From upper left to bottom right: Maria Matveeva, Anna Voica, Serge Ivanets, Vice-Rector Peter Moser, Evgeniy Lyubin and Anastasia Kucheryavaya at one of the meetings to plan the event

The conference will be held over two days (11-12 August 2021) and is taking place as part of the Year of Science and Technology in Russia at the Sirius Park of Science and Art in Sochi (Russian Federation).

It will be attended by leading senior and young scientists from Russia, Austria, Germany and France and will include round-table discussions, case competitions and presentations on ecological (environmental) topics, which will serve as a nucleus for further joint activities.

Montanuniversität Leoben/ the Austrian branch will travel to Sochi with a high-ranking delegation from the university, led by Rector Wilfried Eichlseder.

The main objective of the event is to raise public awareness of climate change issues and provide an opportunity for extended communication and exchange of experiences between leading senior and young scientists in the field of responsible resource supply for sustainable development.

Following the meeting, strategic reflections on the topics discussed will be communicated to the scientific community worldwide in the form of peer-reviewed publications and will form the basis for future joint projects and common activities.



SUSTAINABLE DEVELOPMENT APPROACHES IN ENGINEERING RESEARCH & EDUCATION

AN ONLINE LECTURE - SERIES 2



SELECTED EXAMPLES BROUGHT TO YOU BY
RENOWNED INTERNATIONAL EXPERTS IN THE
FIELDS OF RAW MATERIALS, MINING,
MATERIAL SCIENCES, RECYCLING & ENGINEERING
EDUCATION

SIGN UP AT EVENTBRITE:
[UNESCO_MINING_AUT.EVENTBRITE.COM](https://www.eventbrite.com/e/unesco-mining-aut)



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United Nations
Educational, Scientific and
Cultural Organization



International Competence Centre
for Mining-Engineering Education
under the auspices of UNESCO



unesco@unileoben.ac.at

“We are very glad that more than 330 people from over 20 different countries have signed up for one or all of our lectures. Each lecture is attended by around 100-160 participants. This is a remarkable success.”- Peter Moser, Vice-Rector and Director of the Austrian branch.

The current situation of uncertainty is an important opportunity to learn from this exceptional situation to adapt to changes and enable continuity.

Higher education institutions all over the globe have accelerated the implementation of modern learning methods and created new opportunities with partner institutions, such as virtual mobility, shared resources, networking and joint online activities.

Within the network of the Centre for Mining Education UNESCO, the Austrian branch proposed the implementation of a series of online research and education lectures.

“We are delighted that after successfully holding this series last semester, the lectures this semester were attended with even greater interest.” – Anna Voica, Communications & Partnership Manager who coordinated the lectures.

We were pleased to showcase international experts representing our partner institutions:

- From the Centre for Mining Engineering Education under the auspices of UNESCO:
 - the headquarters at Saint Petersburg Mining University (SPMU), Russian Federation;
 - the Finnish branch at Lappeenranta-Lahti University of Technology (LUT), Finland;
 - the German branch at Technische Universität Bergakademie Freiberg (TUBAF), Germany;
 - the Austrian branch at Montanuniversität Leoben (MUL), Austria.
- Mixed Reality Handbooks for Mining Education (MiReBooks), Europe;
- Engineers for a Sustainable Future (ESF), Austria;
- UNESCO Global Geopark Styrian Eisenwurzen (Geopark), Austria.

The lectures were held under the umbrella title “Sustainable Development Approaches in Engineering Research and Education.”

GOAL

The aim of the establishment of a series of online research and education lectures was to build up and promote networking among researchers, which would lead to the facilitation of future joint research activities.

In addition, we wanted to connect lecturers/researchers with students (PhD/Master’s level/Bachelor’s level) through knowledge sharing and interaction, the goal of which was to encourage debate and the exchange of experiences.

FORMAT

Alternating every week, a speaker from MUL/LUT/SPMU/TUBAF/MiReBooks/ESF/Geopark gave a keynote speech within their area of expertise and/or presented ongoing research projects, followed by a lively discussion in the Q&A session moderated by our communications manager Anna Voica.

With the goal of opening the lecture series to the wider public, registration was free of charge and available at Eventbrite, an event management and ticketing website, via https://unesco_mining_aut.eventbrite.com.

Thematic area 1: Sustainable mining aspects

- Responsible Mining Approach – Basics: Prof. Carsten Drebenstedt (TUBAF)
- Life Cycle Assessment in Mining Engineering: Prof. Jan C. Bongaerts (TUBAF)
- Mechanical extraction methods and technologies for deep-sea mining: Dr. Taras Shepel (TUBAF)
- Mining technologies and sustainable development: modern challenges and prospects: Prof. Oleg Kazanin (SPMU)

Thematic area 2: Digitalisation in mining

- Digital competencies as a basic requirement for modern mining and energy: Dr. Yuriy Zhukovskiy (SPMU)
- Measurement and digital analysis of mining processes: Dr. Philipp Hartlieb (MUL)
- Emerging role of robots in mining: Prof. Nikolaus Sifferlinger (MUL)

Thematic area 3: Sustainability & circular economy

- Sustainability issues in mining- what needs to be made „sustainable?": Dr. Michael Tost (MUL)
- Circularity of Critical Metals: Dr. Sami Virolainen (LUT)
- Sustainable Development & Circular Economy: Industry Prof. Jutta Nuortila-Jokinen (LUT)
- Competing land-uses and public interests: The role of minerals safeguarding and possible land-use planning instruments: Dr. Katharina Gugerell (MUL)

Thematic area 4: Projects and initiatives

- Mixed Reality Handbooks for Mining Education: Manuel Labrador Ortega MSc (MiReBooks)
- The role of engineering in tackling climate change: Dr. Christoph Ponak (ESF)
- UNESCO Global Geoparks: Sustainable development in former mining regions across Europe: Oliver Gulas-Wöhri, MSc (UNESCO Geopark Styrian Eisenwurzen)





PROFESSOR CARSTEN DREBENSTEDT

RESPONSIBLE MINING APPROACH

TU BERGAKADEMIE FREIBERG, GERMANY

On 9 April 2021, the online lecture series was kicked off under the title “Responsible Mining Approach” by Professor Drebenstedt from the German branch.

Carsten Drebenstedt is a professor of surface mining, the former vice-rector for research, the former dean of the Faculty of Geoscience, Geoengineering and Mining, a member of the senate and the director of the Institute for Mining and Special Civil Engineering at TU Bergakademie Freiberg. He teaches and organises programmes and conferences nationally and internationally. He has also published numerous books and papers and worked on over 100 scientific, educational and industrial projects.

He started his presentation by drawing our attention to the fact that due to the growth of the population worldwide, the desire for better technology and the increase in the standard of living, the need for more raw materials is expanding.

Steady growth is the common tendency for global raw material consumption. Not only the amount of materials has increased, but there is also a greater diversity among the required minerals.

In his lecture, Professor Drebenstedt addressed the social challenge the mining industry is facing: a poor reputation. The field of mining is often perceived as environmentally harmful and greedy for profit.

In his opinion, it is important to counteract and ensure that the mining industry has and receives public acceptance.

He pointed out that it is essential to continue developing and advancing mining techniques and procedures to reduce risks to health, safety and the environment.

As a result of the above-mentioned considerations, he went on to compare two different mining approaches.

The first one is based on maximum profit, where mostly high-grade ores are mined. This strategy leads to a high volume of waste materials; in addition to overburden, low-grade ores are not processed, which also leads to a loss of valuable components.

The second approach is based on moderate profit with more environmental and social considerations. The extraction level of the main product is increased and the lower-grade ores are processed. The waste rock is repurposed, creating a second source of income. Reclamation plans are considered and planned in the budget during the entire life cycle of the mine.

Reclamation and the cultivation of mining areas come with considerable costs that many companies unfortunately try to avoid. He emphasised that this would play a vital part in regaining social acceptance of the mining industry.

He suggested that considering standards vary a lot depending on the production country and governments are taking too long to issue regulations, consensus within the mining industry should be found.

In the following Q&A session, questions were asked concerning the profitability and position of the mining industry in the media, among others.

TU Bergakademie Freiberg, Germany



PROFESSOR JAN C. BONGAERTS

LIFE CYCLE ASSESSMENT IN MINING ENGINEERING

TU BERGAKADEMIE FREIBERG, GERMANY



On 14 April, the second unit of the Austrian branch's online lecture series, with the title "Life Cycle Assessment in Mining Engineering," took place.

The lecture was held by Professor Jan C. Bongaerts, who is an emeritus professor of environmental and resources management. He is still affiliated with the Faculty of Business Administration and the Faculty of Geo-Sciences, Geo-Technics and Mining. In his lecture, the audience could catch a glimpse of his extensive experience in teaching issues related to environmental protection, environmental technologies, environmental risk management and renewable energy technologies, amongst others.

Professor Bongaerts has widely published in books and refereed journals and has managed several international education projects. Currently, he teaches several courses related to mining economics, mine planning, the financing of mining operations and mining and stakeholder analysis and management.

Professor Bongaerts introduced the attendees to the concept of the life cycle assessment (LCA), which is a method to systematically identify environmental and human health impacts of a product or technical process across all stages, such as extraction of primary resources, development, manufacturing, use and after-use treatment and recycling.

LCA is used to get an overview of environmental and health impacts of a product, service, or process, and identify stages of a process with high or low environmental and health impacts. It can then be used to compare different products and processes, identify optimisation potential and develop concepts for environmental and health protection design.

Professor Bongaerts recommended that the purpose and extent of an LCA should be defined at the start and that it is important to define the system boundaries correctly in line with the purpose.

He underlined the possibilities of using LCA in mining with three case studies.

The first case study concerned ferronickel mining and processing, estimating the impact of switching partly to green energy or utilising waste, compared to the current state. The study concluded that the impact of mining was comparatively low.

The second case study dealt with drilling and blasting for overburden removal in an open-pit coal mine. The study covered nine different categories for LCA and therefore generated many possible outcomes.

The third and last study focused on the flooding of a closed open-pit mine with either groundwater from nearby, freshwater from a distant source or pumping and haulage of saline water for underground storage. It was shown that the freshwater solution had more impacts than the groundwater solution, due to the complexity and the necessity of construction.

The lecture was concluded by showing the benefits of using LCA for mining operations. It is an opportunity to identify aspects of mining operations stage by stage to a wider extent than what is required in feasibility studies. This can then lead to better mine planning, choices of mining technologies and energy sources. He did, however, emphasise the necessity for good data, which is sometimes difficult to acquire.

In the following Q&A session, many questions were asked, especially about the limitations and possible difficulties of the application of LCA in mining.





DR. TARAS SHEPEL

MECHANICAL EXTRACTION METHODS AND TECHNOLOGIES
FOR DEEP-SEA MINING

TU BERGAKADEMIE FREIBERG, GERMANY

On 21 April, the third instalment of the online lecture series on “Mechanical Extraction Methods and Technologies for Deep-Sea Mining” was presented by Dr. Taras Shepel.

Dr. Shepel is a research associate at TU Bergakademie Freiberg. His PhD thesis was related to the investigation of the process of digging marine sediments. In 2013, he took part in a marine expedition in the Black Sea, during which he investigated the dynamic and kinematic characteristics of a drag-bucket dredge while sampling sapropel sediments at a water depth of 2000m.

He is certified in computer modelling, analysis and the optimisation of machine design. He is the author of 30 scientific publications, including 2 patents. The development of technologies for the extraction of raw materials under extreme environmental conditions is part of his research interests.

Dr. Shepel started by setting the scene: due to the growing demand for raw materials driven by global trends such as population growth and the rise of the global middle class, mining will not disappear. In addition, a transition to a climate-friendly, low carbon economy will require a huge quantity of raw materials.

Seabed minerals are becoming an important strategic alternative for establishing a more diverse import market to secure domestic industries against market shocks and increased prices. At the same time, the most valuable marine minerals such as polymetallic nodules, polymetallic crusts and seafloor massive sulphides are located at great water depths and their recovery is extremely challenging. Mechanical extraction technologies for deep-sea mining are distinguished by their relatively simple design and flexibility.

However, they have several disadvantages constraining their widespread use for mining seabed minerals.

In his lecture, Dr. Shepel focused on different mechanical dredging methods considered for deep-sea mining applications. He explained the functionality of a drag-bucket dredge, clamshell-dredge and continuous-line bucket system. He discussed the disadvantages and limitations of a drag-bucket dredge compared to other options, which have a relatively low productivity due to the limited maximum bucket size, lack of control over the bucket, risk of cable entanglement and a possible negative environmental impact.

He then went further into the comparison of a drag-bucket dredge, the CLB system and a hydraulic dredge for the case of mining sapropel sediments in the Black Sea. This comparison provided very good results for the hydraulic dredge regarding annual capacity and costs per tonne, but the technical feasibility is unfortunately low.

During the Q&A session, the participants were especially interested in the environmental impact of deep-sea mining, which is an aspect that has yet to be investigated since the marine environment is, to this day, very much unknown. It showed that this is the reason why at the moment no deep-sea mining activities take place, but extensive exploration activities and tests of the excavation machines.



PROFESSOR OLEG KAZANIN

MINING TECHNOLOGIES & SUSTAINABLE DEVELOPMENT

SAINT PETERSBURG MINING UNIVERSITY, RUSSIA

On 30 April, the fourth unit of the Austrian branch's online lecture series, entitled "Mining technologies and sustainable development: modern challenges and prospects" took place.

The lecture was held by Dr. Oleg Kazanin, Professor and Dean of the Mining Faculty at Saint Petersburg Mining University. Professor Kazanin is a member of the Research and Technical Council of the Coal Mining Industry and an expert in the research and educational sphere of the Russian Ministry of Science and Higher Education. He has published over 140 research works, including 9 patents.

Professor Kazanin started his lecture emphasising that the mining industry is the basis of almost every business value chain and that therefore, mining production plays an inevitable part in sustainable development.

He continued to show some challenges that mining technologies are facing nowadays, such as fluctuating mineral prices, different geological conditions, low ore grades, isolated mine sites that come with infrastructural challenges, and, lastly, often adverse community reactions to mining projects.

Considering global growth and regarding the general technology targets for 2030, there are some strategies in place to ensure that the future demands for mineral resources can be met:

This includes reduced consumption, using alternative materials, design and recycling of the products. Another important factor is the development of modern technology to improve efficiency, increase productivity and sustainability.

In the next part of his lecture, Professor Kazanin focused on the perspective of mining technology-trends. He mentioned that the choice of mining



equipment and the continuing improvement of automation in mining machinery play a vital role in terms of efficiency. In addition, the change and adaptation of mine layouts should be considered to increase productivity. He did, however, point out that these choices can be very different for each mine, since one solution does not fit all, and it has to be chosen accordingly to fit the geological, technical and civil circumstances.

This was followed by a segment about safety and risk assessments. Safety measures and possible hazards have to be considered throughout the entire life cycle of a mine. Multifunctional safety systems should be in place and continuously updated, as well as the ongoing training and development of personnel.

The following part of the lecture dealt with intelligent mines, in which 3D models of deposits and the processes are used to optimise the design of mining operations. In this context, IT technologies are used through all stages of modelling, resulting in a complete digital representation of the real production facility. During the production process itself, this concept is based on autonomous equipment, off-site services for machine diagnostics, remote operating centres with fewer operators, but more highly skilled employees.

Lastly, Prof. Kazanin touched on the topic of invisible mines. The implementation of this concept for large-scale mines still lies in the future. The lecture ended with a Q&A session in which the participants asked about the benefits of digitalisation in mining and the importance of data to ensure automated equipment is working the way it should be.



DR. YURIY ZHUKOVSKIY

DIGITAL COMPETENCIES AS A BASIC REQUIREMENT FOR
MODERN MINING AND ENERGY

SAINT PETERSBURG MINING UNIVERSITY, RUSSIA

On 6 May, the fifth unit of the Austrian branch's online lecture series titled "Digital Competencies as a Basic Requirement for Modern Mining and Energy" took place.

The lecture was held by Dr. Yuriy Zhukovskiy, associate professor at the electrotechnical department and director of the Research Center for Digital Technologies at Saint Petersburg Mining University.

His lecture was divided into two main parts.

It started with an overview of the current global energy challenges, concerning not only the energy sources but also the energy consumption:

technologies are continuously improving and getting more efficient, but the number of energy consuming devices is rising rapidly. Another factor that often fails to be included concerning energy consumption and environmental footprints are cryptocurrencies.

Digital transformation will play a vital role in the global challenges that arise with our growing population. This growth comes with an increase of consumption of raw materials and energy, migration to large cities is expected and the living standards are rising globally. Scientific and technological processes will have to progress towards improvement and efficiency, especially focusing on the energy industry and energy consumption.

Dr. Zhukovskiy emphasised that, in order to become efficient and transform an industry, one also has to understand processes and be aware of the progress made outside of that industry, and for mining, energy sources and consumption are key sectors to observe.

He went on to the second part of his lecture by raising one important question: what is digitalisation? Most people, when thinking of digitalisation,

have the change of an analogue process to a digital one in mind. However, it is not only a technical transformation, but a transformation of an entire industry. This includes transformations of business processes, in regulation, of the energy structure and in management.

Making these changes will take time, but when the transformation process is completed, a digitalised industry comes with a lot of benefits. The processes will be faster and the production will be a lot more flexible as it will be possible to easily adjust products to changes in the supply demand and the clients' needs.

In addition, the industry will be economically more efficient as the processes will operate together harmoniously.

Concerning the mining industry, Dr. Zhukovskiy was sure that, if the mining industry cannot be made efficient and sustainable, all other industries will not be efficient and sustainable, since almost every other industry is in some way connected to the mining industry.

He underlined the importance of digitalising systems as a whole, because just digitalising parts of them would not achieve big enough effects. It is essential to remember that investing in digital technologies means investing in the work towards the achievement of the sustainable development goals.

The lecture ended with a Q&A session, in which questions about cyber security concerning data used in mining and trends of artificial intelligence and virtual reality in mining were asked.

DR. PHILIPP HARTLIEB

MEASUREMENT AND DIGITAL ANALYSIS OF MINING PROCESSES

MONTANUNIVERSITÄT LEOBEN, AUSTRIA

On 10 May, Dr. mont. Philipp Hartlieb gave us an insight into the complex and challenging topic of “Measurement and digital analysis of mining processes.”

Dr. Hartlieb is a senior scientist at Montanuniversität Leoben, Austria. He holds an MSc in Applied Geosciences and did his PhD at the Chair of Mining Engineering of Montanuniversität Leoben on “Investigations on the effects of microwaves on hard rock” in 2013.

His research focuses on rock fragmentation and excavation technologies, including drilling & blasting, mechanical excavation and alternative excavation methods, as well as the efficient acquisition, use and analysis of data in the mining process. This leads to a holistic picture of the entire process, quantifying the effects of upstream processes (e.g. blasting) to downstream (run of mine).

The lecture started with an example of a commonly used mining process; Dr. Hartlieb discussed the process steps where data can be generated. After the question where data is generated was answered, he asked the audience their opinion on what types of things could be measured, which happened through an interactive online poll. The wide variety of answers given from the audience mostly overlapped with his examples. This overview allowed a good insight into how huge and versatile the field of data measurement actually is. He stressed how much digitalisation would actually be possible and how little was actually happening; this statement was backed up with diagrams concentrating on the grade of digitalisation in different sectors of our daily lives and among others, one especially on the mining sector.

Nowadays, nearly every activity



can be expressed through numbers. However, the true challenge is to use those numbers efficiently and transform them into usable information. An important factor for data analysis is the nature of the data. A distinction has to be made between quantitative and qualitative data, structured and unstructured data and last but not least, direct and indirect data.

After an explanation of the above-mentioned data types, he introduced the key performance indicators (KPI), a tool for working with data. Through data, we gain insight into the mining process; the KPIs act as a set of measures focusing on those sides of organisational performance that are critical for the success of the organisation. Which KPIs are important for an operation vary from mine site to mine site. They have to be chosen individually for every application. In the minutes that followed, Dr. Hartlieb explained several different types of KPIs. Using a case study, he went into more detail about technical, temporal and spiral KPIs and showed their operational value for a conveying process with trucks in a mine.

To close his lecture, Dr. Hartlieb emphasised the importance of choosing data to be processed carefully. What kind of data fits together? Is this kind of data meaningful? Is it better to elevate a small amount of data which is usable and expressive than to have a lot of non-significant data?

In the Q&A session, Dr. Hartlieb was available for 30 minutes to answer most of the audience's questions.

The attendees showed a keen interest, especially in methods for choosing the right KPIs for a process evaluation. Other topics of importance for the listeners were the relevance of technical competencies of future engineers in the field of using evaluation programmes and programming in general.





PROFESSOR NIKOLAUS SIFFERLINGER

EMERGING ROLE OF ROBOTS
IN MINING

MONTANUNIVERSITÄT LEOBEN, AUSTRIA

On 19 May, Professor Nikolaus Sifferlinger from Montanuniversität Leoben shared his knowledge and broad work experience on the emerging role of robots in mining.

Dr. Sifferlinger has built his university career at Montanuniversität Leoben: in 2006, he earned his PhD on “Product Safety of automated Mining and Tunnelling Machinery;” in 2014, he became a senior researcher, lecturer and project manager and since 2016, he has been a professor of excavation engineering at the Chair of Mining Engineering and Mining Economics.

Professor Sifferlinger started his lecture with an overview of underground mining conditions. The harsh environment of an underground mine, like high temperatures at great depths, toxic gases, the danger of rock fall or rock burst, just to name a few, are demanding conditions for human operators. Occupational health and safety aspects add to this.

The desire to replace human operators with robots is a long-standing one. Besides the above-mentioned reasons, raising the efficiency of operations and the sustainable usage of resources are additional main drivers to establish fully automated mines.

Nowadays, the tasks of mining robots are exploration, roadway development, the installation of infrastructure production and transport.

Dr. Sifferlinger especially stressed the importance of the development of robots in the area of maintenance and repair work, because without covering this working area, a take-over from human operators will not be possible.

In this context, it was also pointed out that budgets for R&D in the mining industry are limited; as a result,

robots made for mining only are beyond reach.

Fortunately, an engineer would not be an engineer if he could not find a solution to this problem: removing human operators from dangerous areas is particularly a demand of the space and military industry. Those are sectors with an immense budget for development, which brought robots like the humanoid ATLAS and the four-legged SPOT (both from Boston Dynamics) to life. SPOT, for example, is already used at a mine in Sweden as a pilot project to monitor dangerous areas after rock bursts.

While Professor Sifferlinger mentioned that those high-tech robots are still ambitions for future mining engineers, he emphasised that there are robots already working in mines, for example the CAT Long-wall Automation. This system operates in good coal seam conditions and is 98% automatic. Another example he showed the audience was autonomous trucks, which are used in underground mines just like they are in open-pit mines.

A point worth mentioning for him was the topic of cyber security. The threat of cyber attacks is a real one and has to be brought into consideration while planning an autonomous mine. He could not stress the importance of this topic enough.

To conclude his presentation, he introduced the use of mining robots in the interstellar sector. He believes that the topic of space mining will definitely be one of the future challenges mining engineers face as a major part of humankind’s plans to conquer space.

The subsequent Q&A mirrored the great interest of the audience. Many questions were asked, especially on the topic of autonomous mining, as it is not greatly present in the daily mining business, and how the realisation could be driven forward.

DR. MICHAEL TOST

SUSTAINABILITY ISSUES IN MINING

MONTANUNIVERSITÄT LEOBEN, AUSTRIA



On 26 May, the eighth unit of the Austrian branch’s online lecture series titled “Sustainability Issues in Mining – What Needs to Be Made Sustainable?” took place.

The lecture was held by Dr. Michael Tost, senior researcher at Montanuniversität Leoben and owner of Mango Impact e. U., a sustainability consultancy in Austria.

Before starting his own business, he worked for Vale, at the World Economic Forum, and for over 12 years internationally in sustainable development-related roles for Rio Tinto.

Dr. Tost’s lecture revolved around the question as to whether or not mining can be sustainable. He focused on the three spheres that are impacted by the mining industry, namely the environment, society and the economy.

He took a short detour to the past and the beginnings of the mining industry, where mining used to have a relatively small impact on the environment and the public viewed mining as an important and respected branch of industry, as mining led many countries to increasing their wealth.

Dr. Tost went on to compare those perceptions of the past to where the mining industry stands today:

Water use, land use, and CO2 emissions not only impact the environment, but are also very present in the public eye, giving the mining industry a bad reputation and public unacceptance.

Furthermore, many deposits of resources are located in areas with rich biodiversity, which is a cause for conflict.

In addition to that, automation plays a part in social and economic issues, reducing the number of jobs, especially in poorer regions.

Another aspect is the impact of the extraction of non-renewable materials on renewable materials, and if that impact is not more important to focus on than the finite nature of non-renewables itself.

The most important question of this lecture was a very basic one: What does sustainability even mean?

The answer to this question is that sustainability is dependent on the definition of the term “sustainability.”

Dr. Tost talked about the difference between weak and strong sustainability. The concept of weak sustainability assumes that sustainability can be achieved if well-being is increased. In other words, if a negative impact creates a positive outcome that outweighs the negative impact, the process is still sustainable, even if it is minimising natural capital.

Strong sustainability, on the other hand, says that wealth and well-being are limited by natural capital, and if natural capital is decreased, the process can never be sustainable.

He concluded that, depending on the definition, mining can be sustainable in terms of weak sustainability, but will never be sustainable in terms of strong sustainability.

In the following Q&A session, questions were asked about the time frame for sustainability in mining and how sustainability can be made a valuable asset for companies.





DR. SAMI VIROLAINEN

CIRCULARITY OF CRITICAL METALS

LUT UNIVERSITY, FINLAND

On 1 June, the ninth instalment of the Austrian branch’s online lecture series with the title “Circularity of Critical Metals” took place.

The lecture was held by Dr. Sami Virolainen, leader of a research team in Industrial Hydrometallurgy at LUT University, focusing on solvent extraction and ion exchange. Additionally, he is the director of a multidisciplinary research platform “Sustainable Circularity of Inorganic Materials.”

Most raw materials used in modern technology, high-tech applications and energy applications are metals. The balance between the supply and demand of metals, above all critical metals, is a huge challenge, especially because primary resources in Europe are scarce, as stated by the speaker.

Although recycling processes for key materials are already increasing and advancing, the industrialised countries are exporting the majority of these highly valued materials in waste and scrap.

Dr. Virolainen drew attention to the challenge that comes with the concept of metal circularity. Even though in theory, you can separate anything from anything using solvent extraction, it is not possible in real-life industry since there are many other factors that need to be considered. This includes process reliability, the availability of reagents, water balance, and impurities that might cause problems during the separation. Besides, the cost of the process itself usually causes waste.

He put emphasis on the fact that one cannot focus solely on the technical aspect, but needs to consider economic, political, environmental and social aspects.

Dr. Virolainen continued his presentation by showing facts and figures about raw materials and their resi-

dues remaining in solid and liquid wastes of the mining and metallurgical industry.

One big sector with recycling potential he mentioned is anthropogenic waste, in other words electrical and electronic equipment. In Europe, out of the millions of tonnes of electrical and electronic products generated, less than 40% are reused or recycled. Advances need to be made concerning the recycling processes, but money is still a big factor. In order to get companies to recycle products, the recycling processes would need to be economically profitable.

He also touched on the topic of possible movable recycling plants. The idea is that a moving container with specific equipment needed for the separation would be cheaper than the transport of waste electronics.

He closed his presentation with an explanation of the functionality of solvent extraction and ion exchange. These procedures make it possible to recover critical metals, such as cobalt or lithium, with a very high purity.

The lecture ended with a Q&A session, in which questions about the likelihood and feasibility of a truly circular society and the flaws of circular processes were asked.



INDUSTRY PROFESSOR JUTTA NUORTILA-JOKINEN

GLOBAL SUPPLY CHAINS OF CRITICAL RAW MATERIALS

LUT UNIVERSITY, FINLAND



On 11 June, the tenth unit of the Austrian branch's online lecture series with the title "Sustainable Development and Circular Economy" took place.

The lecture was held by Jutta Nuortila-Jokinen, who holds an industry professorship in separation technology in circular economy at Lappeenranta-Lahti University of Technology. She has over 30 years of experience in both academia and industry. Her special fields of expertise lie in a holistic approach and a deep understanding of separation technology when developing value added and environmentally benign processes and services for the process industry.

She started her presentation pointing out that consumption worldwide is rapidly growing and that a material-hungry world cannot be sustainable. Yet she stressed that a sustainable world has to include social and economic aspects, not just environmental ones.

She stated that the core element of circular economy is the way of thinking. The mindset on the consumers' side has already begun to change. People tend to utilise their products longer and many are starting to buy second-hand. They are also opening up to question whether or not it is necessary to own a product, or if it is sufficient to rent it whenever they need it, carsharing being one example.

The way products are being built has noticeably changed in the past decades. Devices used to be designed for as big a lifespan as possible, and if parts of the device failed, the defective pieces were repaired or exchanged and the product could be used even longer. Nowadays, the service sector for repairs has almost disappeared, as new products are too cheap for repairs to pay off.

This development leaves huge potential for young entrepreneurs to rebuild the service sector, focusing

not only on repairs, but also take back programmes and reselling.

On the company's side, attitude is one of the first challenges that the sustainable development of a product has to overcome. The trend has been that when choosing a company to work for, more and more employees are taking the values into account that the company represents.

In the next part of her lecture, Professor Nuortila-Jokinen spoke about eco-design, which is the most applicable tool to design a sustainable circular economy.

It builds on the principle of continuously thinking about the product and on ways to improve it to have a lesser environmental or social impact. Making a product more sustainable can be economical if waste can be eliminated; less energy or materials are needed for production, which leads to lower costs.

In this context, considering the afterlife possibilities of a product is crucial during the design process, as the worst thing to happen would be for a product to end as toxic waste, because of one material that could have been substituted with something else.

She emphasised that listening to the consumer offers big advantages to a company. Knowing the needs of customers and using that knowledge to adapt the design of the product and improve ecoefficiency is key.

She finished her presentation with various examples of companies and products, and the lecture ended with the Q&A session.



PRIV.-DOZ. DR. KATHARINA GUGERELL

THE ROLE OF MINERALS SAFEGUARDING AND POSSIBLE LAND-USE PLANNING INSTRUMENTS

MONTANUNIVERSITÄT LEOBEN / BOKU WIEN, AUSTRIA

On 16 June, the eleventh unit of the Austrian branch's online lecture series with the title "The Role of Minerals Safeguarding and Possible Land-Use Planning Instruments" took place.

The lecture was held by Dr. Katharina Gugerell, senior research associate at Montanuniversität Leoben and tenure track professor at the University of Natural Resources and Life Sciences Vienna, who teaches internationally in several countries and has managed various international research projects.

As commonly known, minerals play an important role for the European economy. Even though the consumption of minerals per person is expected to go down, the overall consumption is estimated to almost double within the next 40 years, as many minerals are required for future technologies. Therefore, a strong interest on both the policy and industry levels exists to guarantee a secure and continuous supply of the said resources.

The extraction of resources is fundamentally shaping landscapes and transforming natural capital irreversibly. In addition, the extractive sector finds itself in conflicts with biodiversity conservation, urban development, water, animal herding and tourism.

Dr. Gugerell explained the difficulty of implementing safeguarding policies in Europe, as the European Union (EU) does not have the power to launch framework directives. The EU can only give recommendations; the responsibility of accepting and implementing those recommendations lies with each member state.

She highlighted this aspect with the presentation of policy networks and valorisation schemes for resources from several countries such as Sweden, Portugal and Austria. It showed the differences in

the national interests and that the concepts themselves can be composed very differently.

Dr. Gugerell mentioned that safeguarding is still not embedded broadly. One challenge is that there is still little knowledge of how to translate sustainable development goals into feasible and appropriate instruments; another is the amount of information that is needed to actually declare a deposit as worthy of safeguarding.

She went on to describe the role of land-use planning in the resources industry. The aims are to plan and manage spatial resources ahead, while integrating and balancing the many different interests of the public and private sectors.

These competing demands are accelerated by the scarcity of land and the location dependency of resources, and may, in some cases, lead to conflicting directives.

It is essential to make systematic assessments of potential land-use options that fulfil the demands and needs of communities while safeguarding natural resources such as forests, agriculture, watersheds, ecosystems and mineral resources.

Dr. Gugerell closed her lecture emphasising once again the need for land-use policies due to the rising demand for raw materials. These instruments would need to be adjusted and translated into local implementation, as a one-size-fits-all instrument does not exist.

In the Q&A session, the participants were interested in the challenges that arise with conflicting directives.

MANUEL LABRADOR ORTEGA, MSc

MIXED REALITY HANDBOOKS FOR MINING EDUCATION

MiReBooks

On 17 June, the twelfth part of the Austrian branch's online lecture series titled "Mixed Reality Handbooks for Mining Education" took place.

The lecture was held by Manuel Labrador Ortega, now project manager of "MiReBooks" at Montanuniversität Leoben.

Before, he worked in the oil and gas industry for four years, gaining insights into the digitalisation of the industry.

The project "MiRe-Books" is set to deliver new digital standards for higher education across Europe using virtual and augmented reality based (VR/AR) interactive mining handbooks for a new digital learning experience.

Nowadays, digital technologies are introduced into our lives from a very young age, changing the way we assimilate information. Yet, throughout the years of education, the methods of learning are still mainly paper-based and technologies are just slowly starting to be implemented in everyday school life.

For engineering students, the topics become increasingly complex and, in some cases, are abstract and difficult to understand. In this scenario, visiting real operations helps to understand and assimilate these concepts.

Nevertheless, operating sites are often hardly accessible because they are remote and hazardous for students.

MiReBooks is creating a series of mixed reality (MR) mining books that bring the mine into the classroom and enhance the comprehension of complex topics with 3D models that are visualised in AR and VR.

For this purpose, 3D models of mining machinery



are created and 360° videos of mining sites across Europe are filmed.

In addition, suitable texts are written to create a complete learning experience.

MR lectures can be created using the MiReBooks software. This enables the lecturer to add and edit 360° videos and 3D models to the slides in a very user-friendly manner. During the lecture, the software allows the professor to control the lecture from a device, such as a tablet, and interact with the students as they visualise content in VR.

It should be pointed out that this method is not solely limited to the mining sector, since the software for creating the presentations is completely independent of mining. Other fields, such as medicine, can also make use of it as long as the digital content is available.

In the following Q&A session, questions were asked about the chance of making mining more appealing to younger students with this software.



MiReBooks in action in a classroom



DR. CHRISTOPH PONAK

THE ROLE OF ENGINEERING IN TACKLING CLIMATE CHANGE

ENGINEERS FOR A SUSTAINABLE FUTURE, AUSTRIA

On 23 June, the thirteenth unit of the Austrian branch's online lecture series with the title "The Role of Engineering in Tackling Climate Change" was held by Dr. Christoph Ponak.

Dr. Ponak is a senior scientist at the Chair of Thermal Processing Technology at Montanuniversität Leoben. His research concentrated on high temperature recycling processes for communal and industrial residues. He also co-initiated and co-leads the environmental protection association's "Engineers for a Sustainable Future" and "shiftTanks."

This session began with an introduction to sustainable development.

He outlined that in order to be able to start thinking about sustainable development, basic needs of the people have to be met. Bluntly said, it has to be easily achievable for people "not to die." If this is possible, people get quality of life and well-being. Having this state of comfort then puts them in the position to concern about sustainable development.

The definition builds on the well-being of the people and is defined in the Brundtland Report as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

It is not a coincidence that many of the Sustainable Development Goals concern social issues, such as no poverty, zero hunger and good health.

Dr. Ponak continued to talk about the basics of climate change. He explained the greenhouse effect and went into detail about the history of atmospheric CO₂ concentration and the functionality of proxies, which are measurable indicators for past atmospheric compositions.

Lastly, he also touched on current threats to natural, managed or human systems, such as corals, flooding, crop yields, tourism or heat-related morbidity and mortality.

The lecture then switched into a workshop that encouraged all the participants to actively engage in the topic. They were put into several groups and discussed the two questions that Dr. Ponak had posed.

The first question was "What can we do and what is the single most important climate solution?," followed by the second one, "Who is responsible to act and who is the single most important actor?" Each group put their answers collectively into a poll, after which all of the answers were discussed with Dr. Ponak.

For the first question, answers varied from social responsibilities, reducing emissions, renewables, to change of consumption patterns. As for the second question, over half of the participants put the government as the most important actor, followed by the individual.

At the end of his lecture, he suggested that our society tends to see a problem as solved as soon as people agree on a solution, even though it has not been executed yet. Many climate solutions are very material-intensive and producing all the materials needed will take time, effort and money. This makes the availability of climate solution technologies an issue. It will also be hard to achieve sustainability if it comes with personal sacrifices for the individuals.

The participants really enjoyed this different style of lecture.

OLIVER GULAS-WÖHRI, MSc

SUSTAINABLE DEVELOPMENT IN FORMER MINING REGIONS ACROSS EUROPE

UNESCO GEOPARK STYRIAN EISENWURZEN, AUSTRIA

On 24 June, the fourteenth and final unit of the Austrian branch's online lecture series with the title "UNESCO Global Geoparks – Sustainable Development in Former Mining Regions Across Europe" took place.

The lecture was given by Oliver Gulas, who holds a master's degree in Mountain and Climate Geography and is the CEO of the UNESCO Global Geopark Styrian Eisenwurzen.

UNESCO Global Geoparks are single, unified geographical areas where sites and landscapes of international significance are managed with a holistic concept of protection, education and sustainable development. These Geoparks contribute to eight of the seventeen Sustainable Development Goals, such as quality education, climate action, or responsible consumption and production. Today, about 170 UNESCO Global Geoparks exist in over 40 countries, many of them in Europe and Asia.

Mr. Gulas went into detail about the Geopark Styrian Eisenwurzen, located in the heart of Austria around the Styrian Erzberg, which is the largest open-pit iron ore mine in central Europe and the largest siderite deposit worldwide.

Over 80% of the Geopark's area is covered with forests, and the landscape is shaped by 2 rivers. The Geopark contains gorges and caves, castles and waterfalls, museums for forestry or fossils.

The projects within this area are dedicated to preserving nature and protecting habitats, flora and fauna. They are designed to teach people about the geology and nature around them in a playful, interactive way, for example GeoRafting, which is a rafting tour that also teaches about the geological phenomena in the area. The Geopark is also a popular destination for



school classes.

The lecture continued with the presentation of various UNESCO Global Geoparks across Europe:

- Ore of the Alps, located near the city of Salzburg, where the mining of copper, iron and gold has determined life for over 5500 years.
- Karavanke, a cross-border Geopark of Austria and Slovenia. The area has a rich iron and coal mining tradition, and is known worldwide among mineralogists for its lead and zinc ore deposits. They are currently working on a long-distance hiking trail around the Park with a length of 260 km and 12 daily stages of the trails to raise awareness of the rich geodiversity.
- Idrija Geopark in Slovenia, situated at the junction of two mountain ranges, creating an exceptional geoheritage with deep gorges, tectonic phenomena and deposits.
- Geopark Harz in Germany, the largest Geopark in Europe, that is filled with former mining geosites and where former quarries are now home to protected animals and plants.
- Troodos Geopark in Cyprus, that includes the biggest historic asbestos mine in Europe. The rehabilitation of the mine is now a big development project of the region, and already half of the area has already been reforested.

The lecture ended with a detailed Q&A session, giving insights into the management of such Geoparks and ongoing projects at Styrian Eisenwurzen.

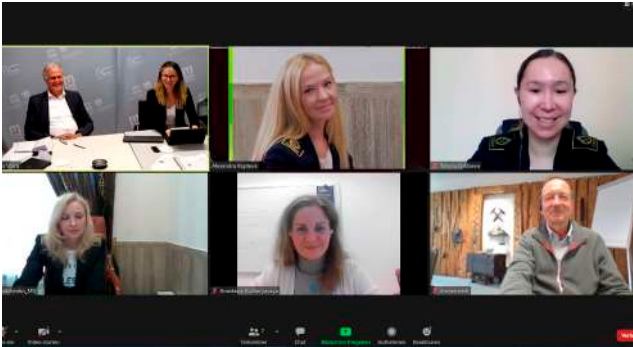


5. EDUCATION, MOBILITY & STUDENT SUPPORT

With the aim of promoting and creating favourable conditions for the education and mobility of students, increasing the number of mobilities and encouraging cultural curiosity and awareness, the Austrian branch focused on the following activities in the first half of 2021:

- INTERNATIONAL JOINT MASTER'S PROGRAMME "ENGINEERING GEOECOLOGY"

Academic year 2021/2022



From upper left to bottom right: Peter Moser, Anna Voica, Alexandra Kopteva, Tatiana Baldaeva, Maria Soldatchenko, Anastasia Kucheryavaya, Carsten Drebenstedt at the selection committee meeting

MUL, SPMU and TUBAF established the International Joint Study Programme "Engineering Geoecology."

For the academic year 2021/2022, from the large number of applications, the fourteen best students from **SPMU and the Nedra Consortium** of Russian Universities have been provisionally admitted to the programme. The students will start their studies at MUL in September 2021 (provided that at that given moment, travel restrictions have been lifted and the Covid-19 measures of the national authorities do not prohibit this activity).

The following course programme has been agreed upon:

- The duration is two academic years of completed university studies:
- 1st semester of the Joint Degree Programme will be held at MUL,
- 2nd semester of the Joint Degree Programme will be held at TUBAF,
- 3rd semester of the Joint Degree Programme will be held at SPMU,
- 4th semester is planned for the M.Sc. thesis at the respective home university.

Students have to earn at least 30 ECTS credits per semester. In accordance with our mission "We educate today's engineers for a sustainable tomorrow," the curriculum includes courses related to sustainable development and mining, allowing the young generation of engineers to acquire this specific knowledge during their studies.

Academic year 2020/2021

We have asked our students who started our master's programme last year about their experiences of their online winter semester 2020/2021 at Montanuniversität Leoben. Below, we would like to share their impressions with you:

Which courses did you take part in?

Students attended not only professional courses like Introductory Mining I, Economic Geoecology and Mining Economics and Mineral Economics, but also more general courses for different engineering students such as "Sustainable Development: History of thought, basic concepts and current applications." German language courses were also part of the curriculum in Leoben.

What is the main difference between the education at SPMU and MUL?

Students outlined that the focus in Saint Petersburg was mostly on the technologies used in Russia and provided detailed knowledge about specific domestic enterprises helping for their future careers in the industry. At MUL, lecturers seemed to indicate more general information and give an overview of the global issues, which offers new opportunities and broadens a common understanding.

What positive experiences have you gained from MUL?

Anastasia Kucheryavaya and Anna Voica were very glad to receive acknowledgements for the coordination of the master's programme. You are very welcome, dear students! We would be happy to support you further.

Students also appreciated the lectures given by different universities and companies, the free usage of Microsoft Office for MUL students, the warm atmosphere in classes, the communication with their mates all over the world and the possibility to do an exam again (just if you would prefer a slightly better mark).

What was surprising at MUL?

In the Russian system, "5" is the best mark, and in Austria, it is "1." This means you sometimes need a translation of the international grade. Our students found it interesting that classes include participants from different educational programmes and even years of study. MUL's examination system differs from the Russian one, too. And, mining universities in both Austria and Russia have their special mining uniforms.

What advice would you have given yourself in September 2020 before the start of your master's?

Concentrate on the limited number of courses, be more open and speak more, ask more, do not worry if something does not work immediately, don't be afraid to ask again, study through the whole semester, use the chance to learn a new language, plan your time. The Austrian branch supports each and every piece of this wonderful advice.

After successfully completing the semester, the research work on their master's thesis together with their scientific supervisors at MUL is ahead. The scientific coordinator of the Austrian branch, Anastasia Kucheryavaya, coordinates the master's thesis preparation and communication with mentors at Montanuniversität Leoben. We are looking forward to your accomplishments!

• STUDENT SUPPORT

After a successful virtual get-to-know you meeting, organised by the Austrian branch, several participants asked for support and a discussion about their open questions. Our scientific coordinator Anastasia Kucheryavaya gladly consulted with international MUL students about their internship possibilities in Austria and abroad, visa issues and general information about Austria and in particular, Montanuniversität. As a result of internal discussions, an informational flyer was compiled and disseminated. We are proud to gain the trust of our students and will continue to do our best in supporting them.



- FILM STUDIO



Markus Orthaber in action during the first recordings in the finished studio

It can be seen from various discussions at higher education institutions nationally and internationally that the concepts of blended learning, inverted classroom and flipped classroom will most probably become established in the very near future. In this context, there are considerable efforts at many universities being devoted to updating their technical infrastructure.

In line with this trend, the seminar room on the premises of the Competence Centre has been converted into a video studio for general use by lecturers at our university, the student's union and of course (inter-)national guest researchers. As it is equipped with the appropriate camera, lighting and sound technology, lecturers are now able to produce high quality videos for teaching. Furthermore, with this set-up, the professional recording of contributions to conferences is ensured.

One big project being filmed at the newly set up film studio is the MINT@Leoben initiative, which is a series of introductory courses for first-year students in STEM subjects. The aim is to inspire potential first-year students to study in Leoben and familiarise them with the importance of the basic subjects in a playful way, but also with the social and cultural programmes of Montanuniversität Leoben. With such initiatives, the attention of young people is attracted towards the raw materials, mining and sustainability sector, encouraging them to study in a related study programme.

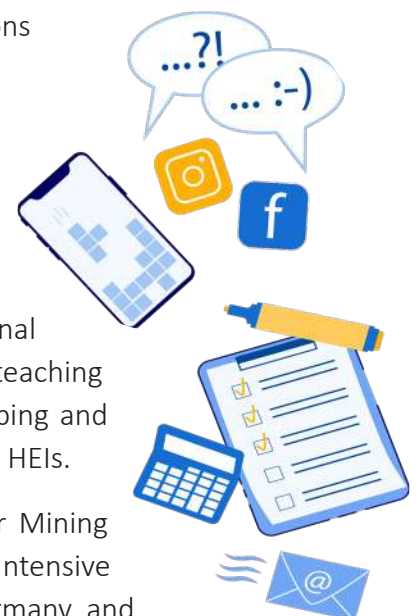
- BLENDED INTENSIVE PROGRAMMES

The Austrian branch, together with Montanuniversität International Relations Office (MIRO), is establishing so-called Blended Intensive Programmes (BIPs) under the new Erasmus+ Programme for the time period of 2021-2027.

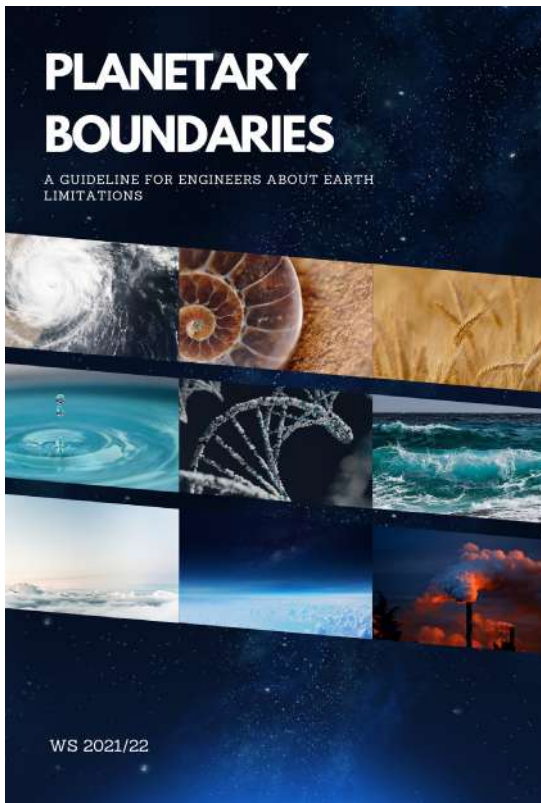
BIPs are short, intensive programmes that use innovative ways of learning and teaching, including the use of online cooperation.

By enabling new and more flexible mobility formats that combine physical mobility with a virtual part, blended intensive programmes give educational institutions the opportunity to organise programmes related to learning, teaching and training for students and staff. They help to build capacity for developing and implementing innovative teaching and learning practices at the participating HEIs.

To strengthen and deepen the existing partnerships within the Centre for Mining Education UNESCO network, we are pleased to establish such Blended Intensive Programmes for staff and students with TU Bergakademie Freiberg, Germany and Lappeenranta-Lahti University of Technology, Finland.



- OUTLOOK: ONLINE LECTURE SERIES- PLANETARY BOUNDARIES



Have you heard about planetary boundaries? And would you ever connect mining engineering and ocean acidification? What about engineering processes affecting the atmospheric aerosol loading?

Announced in 2009, the planetary boundaries framework became a foundation for the United Nations Sustainability Developments Goals. The Austrian branch of the International Competence Centre for Mining-Engineering Education under the auspices of UNESCO has given priority to the topics of sustainability, the global supply of raw materials and raw materials policy. It is aligned with the strategy of the Centre to implement knowledge about sustainable development in our study programmes and research activities. With great acknowledgment of the importance of the planetary boundaries' framework, the Austrian branch would like to offer a special course on this subject to bring our engineering students to the state of the art. This lecture is seen as an opportunity to answer the above-mentioned questions and raise awareness of planetary boundaries for a new generation of engineers.

The course will be available both online and offline, whereby it is not only aimed at students and employees of Montanuniversität Leoben, but also a much broader audience, including our headquarters at Saint Petersburg Mining University, other branches of the Centre for Mining Education UNESCO as well as the community of the European University on Responsible Consumption and Production EURECA-PRO.

The kick-off introduction lecture- if the positive development of the Covid-19 situation allows- will be organised as an in-person event in the large conference auditorium with online streaming to other participants. During this event, the concept of planetary boundaries will be introduced to professors, students and guests. The start of the lecture is planned for 12 October 2021.

Our scientific coordinator Anastasia Kucheryavaya and education portfolio development support Maria Theresa Trettler have already begun planning the main course structure in detail, searching for and inviting distinguished scientists for every lecture and developing the course didactically.

We would like to express our deep gratitude to Dr. Enrique Grabl from Graz University of Technology for his kind revision of course didactics as well as his helpful and encouraging recommendations.

This course is planned for winter semester 2021, starting with the introduction, including a historical overview of this framework and a short description of every boundary. Since there are nine planetary boundaries in total, every weekly session will be devoted to one boundary. Every module will consist of general information about the boundary such as a description and problem definition; secondly, and very importantly, case studies and practical approaches in engineering will be included. The participants will be able to ask questions at the end of each session. Additionally, for those who would like to deepen their understanding of the topic, some extra relevant videos and pre-reading papers will be provided. The course will be finalised with an exam that includes different didactic tasks like multiple choice, open and matching answer questions and an essay about one of the boundaries.

All lectures will be recorded for further usage in follow-up courses and summer schools.

COURSE LECTURERS

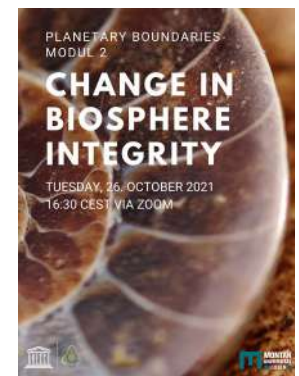
Let us introduce some of our experts.

We are very proud to share with you that Associate Professor of the Stockholm Resilience Centre Dr. Sarah Cornell will hold an introductory lecture. She leads a transdisciplinary sustainability research team. With a scientific background in marine and atmospheric chemistry, Dr. Cornell worked in the global nitrogen cycle and later on continued her research for a global ‘safe operating space for humanity.’ She teaches Challenges of the Anthropocene, an introduction to global change science and policy, in the SRC Master’s programme. After the introductory lecture, students will be able to differentiate among the 9 planetary boundaries and recall examples of the negative anthropological influences as well as an exciting example of the “success story” within the planetary boundary.



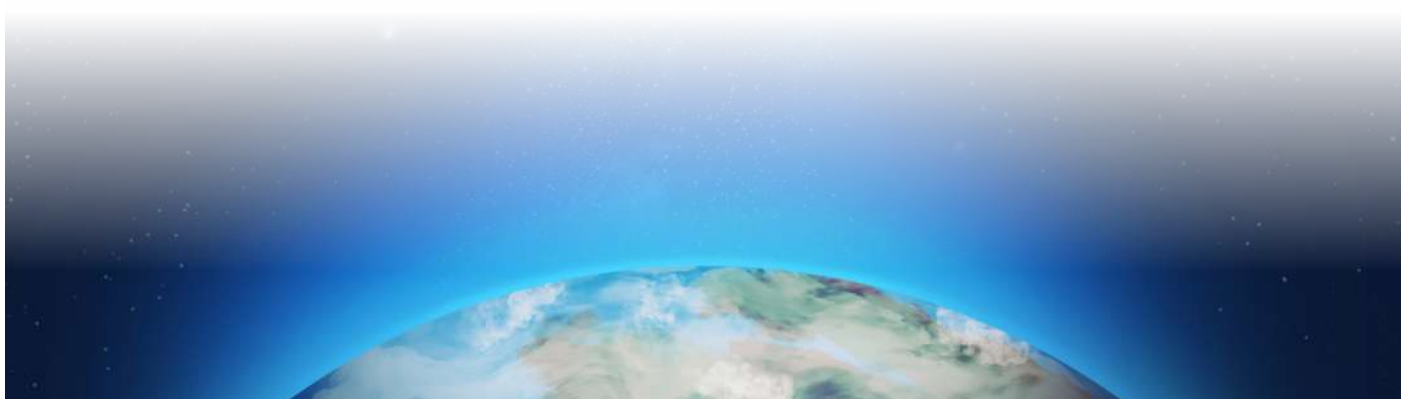
The second lecture will be devoted to climate change. Prof. Gruebler is the leading expert on this topic and is the acting leader of the “Transitions to New Technologies Program” at the International Institute for Applied Systems Analysis (IIASA). He is the review editor of the Intergovernmental Panel on Climate Change, lead and contributing author for numerous international assessments, a board member of international journals like “International Journal of Industrial Ecology,” “Carbon Management” and others. It is our pleasure to have Prof. Gruebler take part in the course, and we are looking forward to his lecture.

We are deeply grateful that the third lecture, “Change in Biosphere Integrity,” will be held by Prof. Gretchen Daily from Stanford University. Prof. Daily is also co-founder and faculty director of the Stanford Natural Capital Project, which gathers 300 partners worldwide and pioneers science, technology, and scalable demonstrations of inclusive, sustainable development. After her lecture, the attendees will be able to consider the change in biosphere integrity in the engineering areas of their research and studies and will understand why it was named a “core boundary.”



Next semester, please let us surprise you with our other lecturers.

We hope that professors, students and guests will be inspired by the introduction to the planetary boundaries concept and integrate it into their professional activities. We would be happy to greet our participants at our brand-new course “Planetary Boundaries.”



6. RESEARCH STRATEGY DEVELOPMENT AND JOINT RESEARCH TOPICS AND ACTIVITIES

The aim of possible scientific collaborations is to create a synergy cooperation for both parties, by extending the areas of investigation and using the unique technologies, expertise and equipment of the partner universities. In an attempt to establish the connection between Saint Petersburg Mining University and Montanuniversität Leoben, an overview of the scientific areas from both sides was established.

Exploring the link between scientific activities, the last few years have seen an increased interest in the topic of hydrogen from both sides, an example of which would be the Hydrogen Conference of the German- Russian Raw Materials Forum, held on 1 December 2020.

Energy-efficient technologies for selective mineral and technogenic raw materials of high added value have been extensively researched. Additionally, the development and formation of a circular economy in the mineral resources sector have received a lot of research attention both in Russia and in Austria. A number of studies have focused on the management of environmental safety during the operation of production facilities. In recent years, the conceptualisation and methodology in creating an intelligent deposit of solid minerals have been researched more and more.

Over the years, an enormous amount of research has been carried out at both universities in an attempt to digitalise mining operations. One such success story is the illuMINEation project led by Montanuniversität Leoben. The study of an Industrial Internet of Things (IIoT) platform



from left to right: Serge Ivanets (SPMU) and Anastasia Kucheryavaya

that connects physical mines has become a key aspect of this research. Augmented reality (AR) and virtual reality (VR) are aimed at extending the area of operational control by means of virtual mining. Considerable research attention has also been paid to digitalisation in mining at SPMU. There is no better example of this than the “Research center for digital technologies,” with numerous laboratories teaching artificial intelligence and the VR methods, among others.

Moreover, necessary competencies for the modern mining engineer have been carefully considered at both universities, leading to an emerging common research area.

The strategy of the joint research could open up several opportunities. Once the Covid-19 situation improves, small projects and PhD semester exchanges will verify the feasibility of topics, collect and analyse data on specific topics and examine the degree to which this could become an extended joint research programme. As a logical continuation, a double PhD programme awaits its implementation.

An example of a joint collaboration is the master’s thesis of Ms. Anastasia Sladkova, who is currently a student in the triple international master’s programme Engineering Geoecology. One of the central claims is to investigate the association between the recycling of steelmaking slags and its impact on sustainable development goal 12, “ensure sustainable consumption and production patterns.” The theoretical framework underpinning this study will be provided by Montanuniversität; in return, the experimental part, including chemical and physical characteristics, will be performed in Russia.

During the pandemic, our main goal was to explore the range of possible common scientific topics, gather information about educational systems (for example PhD awarding), identify the key variables affecting funding opportunities and get to know researchers from partner universities. We are looking forward to proposing a series of opportunities for joint research activities and gaining scientific insights and notable results.

7. PARTICIPATION IN CONFERENCES AND EVENTS

FORUM-CONTEST OF STUDENTS YOUNG RESEARCHERS

JUNE 2021



Every year since 2005, Saint Petersburg Mining University has successfully organised the International Forum-Contest of Students and Young Researchers on “Topical issues of rational use of natural resources.” Since 2018, it has been held under the patronage of the International Competence Centre for Mining-Engineering Education under the auspices of UNESCO.

The 17th edition of the event that took place from 31st May to 6th June 2021 was attended by students, postgraduates and young scientists from Russian and foreign universities along with employees from mining, geological, oil and gas, energy, engineering and metallurgical companies.

This year, more than a thousand participants from all over the world registered for and participated in the forum. Due to the current Covid-19 situation, the Forum-Contest was held in a hybrid format.

It was a great honour that the Vice-Rector of MUL and Director of the Austrian branch, Professor Peter Moser, was invited for the second time to say a few words of welcome during the opening ceremony, among other high-level experts and representatives:

At the beginning, Professor Moser stated that societies are currently undergoing a massive transformation, a transformation that needs to be successful for future generations to be able to meet their needs and live in favourable ecological conditions. “In order to make this transformation successful, we have to concentrate our future R&D efforts on the development of innovative responsible production and consumption systems with low impacts that fit into the boundaries of our planet.”



Vice-Rector Peter Moser welcoming the participants

Having said that, he pointed out that the visionary concept of the circular economy is only feasible up to a certain extent, since the recycling and extraction of substances from waste requires energy which increases exponentially with the percentage of recovery. Thinking one step further, the production of that energy would itself require more raw materials than those extracted from the waste.

For that reason, Professor Moser called for the focus in R&D to be on new materials and products that include aspects of both a maximised circularity of materials and additional functionality.

In the context of the Forum-Contest of Students and Young Researchers, he stressed that the two main prerequisites for meeting the ambitious targets of the Green Deal and the implementation of the sustainable development goals of reduced poverty and a decent life for everybody were:

- the creation of suitable biotopes for enthusiastic, visionary young people in which R&D flourishes; and
- the provision of adequate resources to enable them to work efficiently and effectively.

At events such as this forum-contest, the next generation of researchers in the field of raw materials makes a really important contribution to a more responsible and sustainable production and use of raw materials.

The Austrian branch opened a call for students and young researchers to participate in the forum-contest and present their topics at one of the forum’s breakout sessions.



Professor Thomas Prohaska giving his presentation on the topic „Carbon from decarbonation processes as a valuable resource for sustainable soil management“

The headquarters of the Centre for Mining Education at Saint Petersburg Mining University organised an online conference on the sustainable utilisation of water, air, soil and farm resources. The conference took place from 14-15 April 2021.

On the first day of the conference, more than a dozen international lecturers gave presentations on their scientific projects.

The Austrian branch was represented at this conference by Professor Peter Moser, Vice-Rector of Montanuniversität Leoben and Director of the Austrian branch, who served on the scientific committee. In addition, Professor Thomas Prohaska, head of the Department of Analytical Chemistry at MUL, presented as an expert on the topic of “Carbon from Decarbonation Processes as a Valuable Resource for Sustainable Soil.”

Contrary to the first day of the conference, where only live lectures were held, the second day was dedicated to young researchers in the form of an on-demand platform of pre-recorded video presentations. It has to be mentioned that extraordinary effort was put into making the videos, making them immensely interesting to watch. The entertaining and appealing structure of the conference and the diversified lectures made it a pleasure to attend.

OUTLOOK: 20TH EUROPEAN ROUNDTABLE ON SUSTAINABLE CONSUMPTION AND PRODUCTION

Giving priority to the topics of sustainability, the global supply of raw materials and raw materials policy, the Austrian branch is planning to participate in the 20th European Roundtable on Sustainable Consumption and Production (erscp21) in September in Graz/Austria, promoting awareness of these topics to engineering students, researchers and the broader public.

This roundtable aims to establish a dialogue between researchers, administrations, business participants and broader society about climate protection, sustainable production and consumption. The diverse programme covers “consumption in a sustainable society,” “resilient cities and their infrastructures as pioneers of change,” “production in a sustainable and circular economy” as well as cross-sectional topics. The format of the conference includes not only oral presentations, but also side events, posters and special sessions.

The Austrian branch of the Centre for Mining Education UNESCO submitted a paper - which was accepted - discussing several practical examples, including the online lecture series organised by the Austrian branch, the joint degree master’s programme „Engineering Geoecology“ and international partnerships in education, with a focus on sustainability. Synergies of the recent widespread use of the online format in education and international collaboration enable the creation of new successful opportunities to raise awareness about sustainability in engineering education.



8. MARKETING AND PUBLIC OUTREACH

In order to establish and grow its (online) presence and outreach, the Austrian branch created accounts on various social media platforms. It includes Instagram, LinkedIn and Research Gate. At the same time, by sharing content of your partner institutions, we support the increase of the Centre's visibility.

INSTAGRAM

Instagram is a photo and video sharing social networking service.

Its two biggest user groups are aged 18-24 and 25-34. As it is used worldwide, it allows you to engage with your audience and build a connection with your followers. This is the main reason the Austrian branch started its presence on Instagram.



The target audience on this platform is students of all partners and branches of the Centre. The content shared is primarily hard facts such as information about our activities and those of our partners, study programmes and conferences; secondly, it is information for building cultural awareness and thirdly, insights behind the scenes of the Austrian branch's work.

We are pleased that our Instagram presence is being received with great interest: to name just one figure, out of the 260 followers generated organically so far (these are followers generated without paid promotion), the average reach of our Instagram stories is at 40% (as compared to 8.4% on average)*. Reach is the number of visits a unique account has viewed each slide in your story. In other words: around 100 individual accounts regularly view the content the Austrian branch shares in its stories (information that is only available for 24hours). This is a great step toward building a connection to national and international students and disseminating the vision, programmes and activities of the Centre, its branches and its partners.



Instagram Feed announcing upcoming lectures and events

* <https://www.statista.com/statistics/1180310/instagram-stories-reach-rate-worldwide-account-size/> [as of 31.05.2021]



Centre for Mining Education UNESCO | AUT

BRANCH @ Montanuniversität Leoben | Education & Research on Sustainable Raw Materials Supply | SDGs 4, 7, 9, 12, 13
Bergbau & Metallverarbeitung · Leoben, Steiermark · 323 Follower

LinkedIn is a social network specifically designed for career and business professionals to connect. The Austrian branch’s focus audience on LinkedIn are partners and potential future partners. It also serves as a tool to keep in touch with participants for

our activities, which greatly simplifies and facilitates the initiation of prospective future cooperation.

The information and activities shared on the Centre’s and the staff member’s profile have between 200 and 2200 impressions per article or video. “Organic impressions” on LinkedIn refers to the number of times unpaid content is shown to members.

RESEARCH GATE

ResearchGate is a scientific social media platform devoted entirely to research. The main target audience is scientists along with current and future academic partners. It allows you to not only be updated about accepted and published papers, but also to get in direct contact with the authors. It is a rapidly growing network that provides an overview of scientific fields of interest. It is a valuable and convenient tool supporting scientific collaboration.



PREPARATORY WORK FOR THE LAUNCH OF THE WEBSITE AND YOUTUBE CHANNEL

We are happy to share that in the last months the Austrian branch has been working to launch the website. Very soon you will find informations about our activities, programmes, partners and fields of expertise at www.unesco.unileoben.ac.at.

At the same time, the YouTube channel is being set up, which serves as a platform to watch the recordings of the online lectures series 1 and 2.



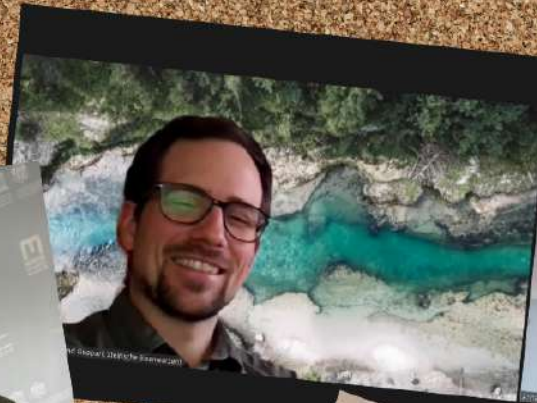
SIGN UP TO OUR NEWSFEED TO RECEIVE RELEVANT INFOS AND UPDATES FOR

- 1) RESEARCHERS, LECTURERS, PROFESSIONALS, OR
- 2) STUDENTS.

<https://unesco.unileoben.ac.at/newsletter>

Sharing events of our partners in the Instagram stories





UNESCO - AUSTRIAN BRANCH INTERNATIONAL COMPETENCE CENTRE FOR MINING- ENGINEERING EDUCATION

Montanuniversität Leoben has been cooperating successfully with Saint Petersburg Mining University for more than 15 years.

This cooperation culminated in December 2019 in the foundation of the Austrian branch of the International Competence Centre for Mining-Engineering Education under the auspices of UNESCO at Montanuniversität Leoben.

In general terms, the International Competence Centre for Mining-Engineering Education is a category II centre of the United Nations Educational, Scientific and Cultural Organisation (UNESCO). It is headquartered at Saint Petersburg Mining University (SPMU), established in March 2018.



Ceremonial signing at the opening of the Austrian branch, Leoben: from left to right: Rector Eichlseder, Vicerector Moser, Rector Litvinenko, 2019, photo credit: Foto Freisinger.

The focus of activities is on higher technical and continuing vocational education and training as well as research, within the scope of the mineral resources sector

and the achievement of the Sustainable Development Goals (SDGs).

Furthermore, it is creating a unique global network for engineers, including:

- ▶ Headquarters: Saint Petersburg Mining University, Russia (SPMU),
- ▶ German branch: Technische Universität Bergakademie Freiberg, Germany (TUBAF),
- ▶ Finnish branch: Lappeenranta-Lahti University of Technology, Finland (LUT)
- ▶ Chinese branch: China University of Mining and Technology, People's Republic of China (CUMT),
- ▶ Armenian branch: National Polytechnic University of Armenia, Armenia (NPUA)
- ▶ Austrian branch: Montanuniversität Leoben, Austria (MUL).

The Austrian branch operates on a global mandate with a specific focus on Europe and Austria and has given priority to the topics of sustainability, the global supply of raw materials and raw materials policy.

ACTIVITIES

In order to closely cooperate with our partners, thus paving the way for joint education and research activities, one focus of the Austrian branch's activities in 2020 was organizing and holding, participating in and attending international online and on-site events:

Conceptualized and coordinated by the Austrian branch, the online research and education lecture series "**Sustainable**

Development Approaches in Engineering Research and Education” was held in cooperation with LUT, SPMU and Aalborg PBL Centre (Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO).

Alternating every week, eight international experts shared their expertise, incorporating selected examples from the fields of mining, mineral raw materials, the sustainable supply of raw materials, materials science, recycling and education.

Receiving excellent feedback, each lecture was attended by students and researchers from more than 20 different countries. On average, 70 participants took part; at the peak there were even 120.

The Expert Forum on Digitalization in the Raw Materials Sector, organized by the Resources Innovation Center Leoben (RIC) and co-organized by the Austrian branch, focused on the progress of digitalization in exploration, mining and mineral processing: as artificial intelligence, machine learning, deep learning, augmented/virtual reality and data integration solutions are increasingly being used to collect, analyze and manage data and visualize content in real time in variable contexts.

The interest in the event – more than 130 participants from more than 20 different countries - showed the importance of the topic and the need for future cooperation in this area.

With fostering innovation being one of the goals of the Austrian branch, the **“Pre-Jumpstarter Workshop”** was organized, in cooperation with EIT RawMaterials. Its aim was to prepare students and young researchers for the application process of the Jumpstarter program: an innovation contest aiming to reach out, identify and support the best ideas from researchers, professionals and early-stage start-ups, with a potential impact on the raw materials value chain.



Reception of the Russian delegation at the Expert Forum, Leoben, 2020. Photo credit: SPMU

The **“Moscow Green Economy Forum”** is an international platform devoted to the discussion and development of a green economy in the world and specifically in Russia.

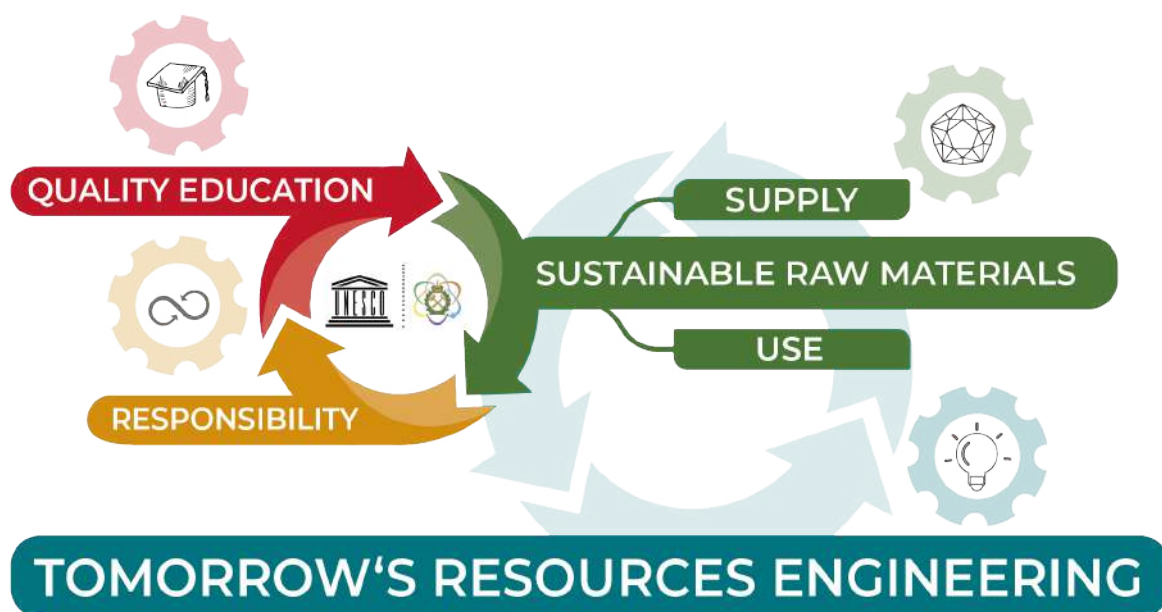
Within the framework of the forum, representatives of the Austrian branch and the director of the Educational Research Center for Digital Technologies at SPMU gave a joint presentation on “Digital competences as a basis for the sustainable development of the energy sector”. On the one hand, the key conditions for the development, adaptation and implementation of digital technologies in the energy sector based on the experiences at SPMU were presented. On the other hand, key milestones and policies of the European Union in the field of educational were introduced.



United Nations
Educational, Scientific and
Cultural Organization



International Competence Centre
for Mining-Engineering Education
under the auspices of UNESCO



Supporting young researchers, eight students from MUL were selected to participate in the International Forum-Contest “**Topical Issues of Rational Use of Natural Resources**”, organized by SPMU. Four of them won the award for best speaker in their category.

ENGINEERING GEOECOLOGY

Another focus of the Austrian branch is the promotion of mobility. In this context, MUL, SPMU & TUBAF established the international Joint Master’s Program “**Engineering Geoecology**”.

Due to the current Covid-19 situation, the program was transformed and adapted to distance learning mode. After an online welcome day and campus tour, the students successfully started their first semester virtually at MUL.

Furthermore, the Austrian branch, represented by Rector Eichelseder, participates in an international working group; the goal is to develop a unified international system of mineral resource sector specialists’ competences, based on existing national

systems and aimed at developing higher level competences.

An additional key activity is the commencement of the development of a research strategy agenda together with SPMU, LUT and TUBAF.

Supporting all initiatives, steadily growing profiles on LinkedIn, Research Gate and Instagram were created to extend the (online) presence and outreach.

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INTERNATIONAL COMPETENCE CENTRE FOR MINING-ENGINEERING
EDUCATION
UNDER THE AUSPICES OF UNESCO
AUSTRIAN BRANCH | MONTANUNIVERSITÄT LEOBEN

Established in December 2019, the Austrian branch of the competence centre is an integral part of Montanuniversität's strategy of internationalisation.

The Austrian branch participates in the global raw materials initiative under the auspices of UNESCO. In general terms, the International Competence Centre for Mining-Engineering Education is a category II centre of the United Nations Educational, Scientific and Cultural Organisation (UNESCO). It is headquartered at Saint Petersburg Mining University (SPMU).

Our mission is to educate today's engineers for a sustainable tomorrow

We aim at drawing attention to the topics of sustainability in the areas of mining, raw materials, materials sciences, recycling, engineering education and raw materials policy.

Our broad range of initiatives targets students (Bachelor/Master/PhD level), researchers and engineering professionals. Further, those are dedicated to engineering education and research in particular in raw materials related sectors as well as the promotion of the Sustainable Development Goals (SDGs) at the national and international levels.

We are offering you access to and collaboration with our network of partners, including Technische Universität Bergakademie Freiberg (TUBAF, Germany), Lappeenranta-Lahti University of Technology (LUT, Finland) and St. Petersburg Mining University (SPMU, Russian Federation) for international exchange and mutual beneficitation. International joint research activities with publishable results, increase of publications, representation and advertisement of scientific expertise would be further targeted outcomes.

Conceptualised and coordinated by the Austrian branch, the online research and education lecture series "Sustainable Development Approaches in Engineering Research and Education" was hold in winter semester 2020/2021 in cooperation with LUT, SPMU and Aalborg PBL Centre (Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO). This format continues in summer semester 2021.

The participation in the online research & education lectures is giving a platform with international audience of researchers and students from our partners and our home university.

Further, we facilitate the development and implementation of joint activities such as international offline and online events and conferences, global staff and student mobility, summer schools and staff weeks with our partner universities.

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Liebe Schülerinnen und Schüler,

herzlich Willkommen in Leoben, inmitten des grünen Herzens Österreichs – der Steiermark. Willkommen an der Montanuniversität, dem Spitzenreiter im Ausbildungs- und Hochschulbereich in Österreich. Mit ihrer Vorreiterrolle zeigt sie seit mehr als eineinhalb Jahrhunderten wie Nachhaltigkeit, Ressourcenschonung und Recycling sich umsetzen lassen. Schon seit ihrer Entstehung war der Umweltschutz und das gewissenhafte Nutzen der vorhandenen Ressourcen für die Montanuniversität sehr wichtig.


Dieser Zeitgeist und das verantwortungsvolle Handeln für eine lebenswerte Zukunft setzen sich fort: Um die globalen Herausforderungen unserer Zeit zu lösen, ist es nötig zusammenzuarbeiten. Wer sein eigenes Süppchen kocht, wird keine Hochzeitsgesellschaft satt bekommen.

Um die Menschheit langfristig mit mineralischen und metallischen Rohstoffen versorgen zu können – die unerlässlich und kaum ersetzbar sind für viele Dinge des täglichen Lebens, wie Smartphones, Computer, Autos, Solaranlagen, Windräder, etc. – ist die Montanuniversität Leoben Teil eines neu gegründeten Zentrums und steht für die erstklassige Ausbildung für die IngenieurInnen von morgen.

In anderen Worten: Deine bestmögliche Ausbildung ist unser Anliegen!

Das Ausbildungs- und Forschungszentrum zum Thema „Bergbau-Energie-Rohstoffe-Nachhaltigkeit ist eine Kooperation zwischen der Montanuniversität Leoben (Österreich), der Bergbauuniversität St. Petersburg (Russland), der TU Bergakademie Freiberg (Deutschland) und der Technischen Universität Lappeenranta-Lahti (Finnland) und steht unter der Schirmherrschaft der UNESCO, der Organisation der Vereinten Nationen (UNO) für Bildung, Wissenschaft und Kultur.

Der Standort des Zentrums in Leoben legt seinen Schwerpunkt auf nachhaltige und leistbare Rohstoffgewinnung, globale Versorgung und Rohstoffpolitik.



Die Aktivitäten tragen ihren Beitrag bei zur Erfüllung der sogenannten SDGs (Sustainable Development Goals): Das sind 17 Ziele zur nachhaltigen Entwicklung, die 193 Länder auf der ganzen Welt bis 2030 erreichen wollen. Außerdem bieten wir in Zukunft ein Studienprogramm im Master und Doktorats Bereich an, bei dem du an drei internationalen Universitäten studieren kannst.

Du findest uns online auf Instagram: [unesco_mining_aut](#)

In diesem Sinne wünschen wir Dir einen großartigen Aufenthalt voller neuer Erfahrungen, Eindrücken und AHA-Momenten und hoffen, Dich bald in Leoben wieder zu begrüßen.

До свидання und ein herzliches Glück auf!

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METALDAYS **25**
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LIST OF ABBREVIATIONS

BIPs	Blended Intensive Programmes
BOKU	University of Natural Resources and Life Sciences, Vienna
EIT RawMaterials	European Institute for Technology on Raw Materials
ESF	Engineers for a Sustainable Future
EU	European Union
EURECA-PRO	The European University on Responsible Consumption and Production
KIC	Knowledge and Innovation Community (of the EU)
LCA	Life Cycle Assessment
LUT	Lappeenranta-Lahti University of Technology, Finland
MiReBooks	Mixed Reality Handbooks for Mining Education
MINT (German) = STEM	Mathematik, Informatik, Natur- und Ingenieurwissenschaft und Technik
MIRO	Montanuniversität International Relations Office
MUL	Montanuniversität Leoben, Austria
Q&A	Questions and Answers
R&D	Research & Development
RIC	Resources Innovation Center Leoben
SDGs	Sustainable Development Goals
SPMU	Saint Petersburg Mining University, Russian Federation
STEM	Science, Technology, Engineering and Math
TUBAF	Technische Universität Bergakademie Freiberg, Germany
UNESCO Aalborg Centre	Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO
UNESCO Competence Centre	International Competence Centre for Mining-Engineering Education Centre under the auspices of UNESCO



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