



Study Handbook

**International Master of Science in Advanced
Mineral Resources Development**

(Joint Master Degree Program)

Semester 1, Montanuniversität Leoben



1st Edition, September 2021

Dear Students of the Joint Master Degree Program “Advanced Mineral Resources Development” (AMRD),

this Study Handbook provides an overview on the courses of the first semester of the Joint Master Degree Program “Advanced Mineral Resources Development” at Montanuniversität Leoben.

It should not only give you a detailed outline on the content of the courses, but also assist you when registering for a course. It describes the topics, learning outcomes and any prerequisites you might need.

In case you have any questions do not hesitate to contact us!

Birgit Knoll

Montanuniversität Leoben

Chair of Mining Engineering and Mineral Economics

amrd@unileoben.ac.at

We wish you good luck for your studies!

Glückauf

Univ.-Prof. Dipl.-Ing. Dr.-Ing. E.h. Dr.mont. Peter Moser
Montanuniversität Leoben
Head of the Chair of Mining Engineering and Mineral Economics
Vice-Rector for Infrastructure and International Relations

Prof. Prof. e.h. Dr. Dr. h.c. mult. Carsten Drebenstedt
TU Bergakademie Freiberg
Institute of Mining Engineering and Special Civil Engineering
Chair of Mining and Surface Mining

Program Structure

Advanced Mineral Resources Development is a Joint Master Degree Programme between Montanuniversität Leoben (Austria) and Technische Universität (TU) Bergakademie Freiberg (Germany) and a six partner universities. Students study the first semester at Montanuniversität Leoben, the second semester at TU Bergakademie Freiberg and the second year at one of the partner universities. The fourth semester is for the preparation of the master's thesis. The language of instruction is English.

Current partner universities are

- Dnipro University of Technology, Ukraine (DUT)
- China University of Mining and Technology Beijing, China (CUMTB)
- Amirkabir University of Technology Tehran, Iran (AUT)
- The Instituto Superior Técnico of the Universidade de Lisboa, Portugal (IST)
- Universidad Politécnica de Madrid, Spain (UPM)
- St. Petersburg Mining University, Russia (SPMU)

The joint master degree program AMRD comprises compulsory subjects (67,5 ECTS), restricted electives (16 ECTS), free electives (6,5 ECTS), the master thesis and the final exam for the master's degree.

	ECTS
Compulsory subjects	67,5
Restricted electives	16
Free electives	6,5
Seminar Master thesis International Master of Science in Advanced Mineral Resources Development	3
Master thesis	25
Presentation and final exam of the master thesis	2
Sum	120

Compulsory subjects

The compulsory subjects consist of the following areas

- Mineral Economics and Project Management (23 ECTS), Montanuniversität Leoben
- Mining and Environment (21 ECTS), Technische Universität Bergakademie Freiberg
- Mining Technology (23,5 ECTS), either Montanuniversität Leoben or Technische Universität Bergakademie Freiberg or one of the AMRD partner universities

Restricted electives

The restricted electives cover 16 ECTS, whereas at least 3 ECTS have to be completed at each of the universities.

Free electives

Free electives cover 6,5 ECTS and can be chosen from any officially recognized university. It makes sense to choose ones free electives from the lists of the restricted electives

The AMRD program covers 120 ECTS points. This corresponds to the usual study period of four semesters (two years). In each semester, 30 ECTS points are usually acquired.

All students complete the first semester of the master program at Montanuniversität Leoben, the second semester at TU Bergakademie Freiberg, and the second year at one of the partner universities. The fourth semester is for the preparation of the master's thesis. This study order is compulsory for all students.

Table of Contents

1. Compulsory Subjects.....	5
Deposit Modelling and associated Software.....	5
Economic Geology and Mining Economics	7
Mine Operation, Scheduling, Costing.....	9
Mineral Economics	11
Mining in Austria, in the European Union and worldwide.....	14
Seminar in Mining Engineering and Mineral Economics.....	16
Sustainable Development: History of thought, basic concepts and current applications	18
2. Restricted Electives	21
Artisanal and Small-scale Mining in Developing Countries.....	21
Continuous Mining Methods and Conveying Technologies in Surface and Underground Mining.....	24
Excavation Engineering.....	26
German as a foreign language A1.1.....	28
German as a foreign language A2.1.....	29
Lab in Mine Ventilation	30
Marine Mining.....	32
Mine Ventilation, Water Control, Infrastructure.....	34
3. Free Electives.....	36
Introductory Mining I.....	36
Introduction in Mining	38

1. Compulsory Subjects

Deposit Modelling and associated Software

Course Nb	200.109
ECTS	2
Type	Lecture/Practical
Offering period	Wintersemester
Lecturer	Haindl
Course description	
Content	<ul style="list-style-type: none"> • Basics of data collection and organization of exploration results in a database • Database management • Data Analysis and Geological Modelling <ul style="list-style-type: none"> ○ Geological Controls ○ Composites • Resource Modelling <ul style="list-style-type: none"> ○ Basics in Geostatistics • Resource Classification
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Basics in MS Excel • Basics in Mining
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to</p> <ul style="list-style-type: none"> • Know about required steps to create a deposit model. • Describe possible threats and limits of models. • Understand basics of geostatistics. • Be able to perform simple tasks using Datamine Studio and Geovia Surpac.
Languages of instruction	English

Teaching and learning method (delivery of skills) workload for students	Mandatory attendance (75% required) Theoretical introduction with assignments (moodle) Practical part in computer laboratory
Assessment	<ul style="list-style-type: none"> • Continuous assessment: Attendance (min. 75%) Written test (theoretical part) 60% (pre-condition for the participation at the practical part in the lab) Active participation 10% Written test (practical/lab) 30%
Further information	
Recommended reading	
Note	The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture. The latest version of the lecture notes will be uploaded at the beginning of the semester.

Economic Geology and Mining Economics

Course Nb	200.050
Credits	6
Type	Lecture
Lecturer	Haindl
Course description	
Content	<ul style="list-style-type: none"> • Economic Geology <ul style="list-style-type: none"> ○ The deposit as factor of production ○ Prospection and exploration ○ Reserves and Resources • Mining Economics <ul style="list-style-type: none"> ○ Factors of production: Means, Labour ○ External cost calculation (P&L, Balance Sheet) ○ Profitability and investment calculations ○ Risk and sensitivity analysis
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Basics in Mining
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to:</p> <ul style="list-style-type: none"> • describe the importance of the deposit as a factor of production. • explain and understand the influences of the factors of production on a mining operation. • perform basic investment calculations, interpret results and know about advantages and disadvantages of several methods.
Languages of instruction	English

Teaching and learning method (delivery of skills) workload for students	Classic class lecture with discussions Active participation and interaction are supported Calculation examples for better understanding
Assessment	Written, digital (moodle)
Further information	
Recommended reading	
Note	The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture. The lecture notes will be available on Moodle.

Mine Operation, Scheduling, Costing

Course Nb	200.110
ECTS	3
Type	Lecture/Practical
Offering period	Wintersemester
Lecturer	Frömmer, Haindl
Course description	
Content	<ul style="list-style-type: none"> • Basics of a mining operation (exploration, factors of production) • Link mining operation – economic situation • Reserves and resources • Cost accounting • Schedule mining blocks with constraints
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Basics in Mining
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to</p> <ul style="list-style-type: none"> • describe internal and external influences on a mining operation from an economic point of view • understand cost accounting principles. • perform basic scheduling tasks using special software
Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	<ul style="list-style-type: none"> • Class lecture with discussions • Active participation and interaction are supported • Practical part in computer laboratory with assignments
Assessment	<ul style="list-style-type: none"> • Continuous assessment: Attendance (min. 75%)

	<p>Written test (part Mr. Frömmer) 60% (pre-condition for the participation at the exercise)</p> <p>Active participation 10%</p> <p>Written test (part Haindl) 30%</p>
Further information	
Note	<p>The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture.</p> <p>The latest version of the lecture notes will be uploaded at the beginning of the semester.</p>

Mineral Economics

Course Nb	200.193
Credits	3
Type	Lecture
Lecturer	Drnek
Course description	
Content	<ul style="list-style-type: none"> • Theory of mineral demand • Determinants of mineral demand • Demand functions, elasticities of demand, supply-cost functions of mineral resources and secondary materials • Competitive vs. producer markets • Factors affecting mineral prices, commodity exchanges, objectives and instruments of mineral policy • Long-term trends on mineral markets • Statistics of energy resources and mineral commodities. • The raw-material commodities are introduced in detail.
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Good general knowledge is helpful
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to</p> <ul style="list-style-type: none"> • Understand the connections and events on raw material markets • Know the fundamentals for analyses of the raw material markets • Impart knowledge in the field of raw material policies and trade

Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	<ul style="list-style-type: none"> • Intensive and permanent active participation; i.e.: presentations, pre-reading assignments • Critical analysis and argument of the presented material <p>Teaching and learning method</p> <ul style="list-style-type: none"> • Presentation of theory and practical examples • Question and answer session • Discussion • Analysis of current economic situation
Further information	
Recommended reading	<ul style="list-style-type: none"> • Britton S. et al: Minerals Economics. In: Mining Engineering Handbook, SME (2nd ed., Vo.1),p. 43 – 139 • Fettweis G.B.: Der Produktionsfaktor Lagerstätte. In: Die elementaren Produktionsfaktoren des Bergbaubetriebs. Band 1 • Gschwindt, E.: Projektierung von Bergwerken im Ausland, In: Die Wirtschaftlichkeit und Bewertung im Bergbau. Band III • Von Wahl: Bergwirtschaft Band I bis III • Von Wahl: Wirtschaftliche Bewertung von Lagerstätten und von Bergwerksunternehmen. In: Die Wirtschaftlichkeit und Bewertung im Bergbau. Band III • Business- and Financial section of the following newspapers: Frankfurter Allgemeine Zeitung Neu Zürcher Zeitung

	<p>Süddeutsche Zeitung</p> <p>Financial Times</p> <p>The Times: London and New York</p> <ul style="list-style-type: none"> • Reference Books: <p>Gabler: Wirtschaftslexikon</p> <ul style="list-style-type: none"> • Further Reading: <p>Annual Report Rio Tinto (Internet)</p> <p>Annual Report BHP (Internet)</p>
<p>Note</p>	<p>The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture.</p> <p>The latest version of the lecture notes will be uploaded at the beginning of the semester.</p>

Mining in Austria, in the European Union and worldwide

Course Nb	200.140
Credits	1
Type	Lecture
Lecturer	Hartlieb
Course description	
Content	<ul style="list-style-type: none"> • Mining Industry in Austria and the EU • Securing Supply of Mineral Resources in Europe • Construction Aggregates in Europe • World View on Mineral Production • Artisanal and Small Scale Mining • Economic Outlook in Mining • Innovation in Mining • Operational Excellence Framework in Mining • Different Presentations by national and international mining executives
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Basic knowledge in mineral economics • Main economic drivers in the mining industry
Objective (expected results of study and acquired competences)	<p>On completion of this lecture the participants shall be able to have a good comprehension of:</p> <ul style="list-style-type: none"> • The mining industry in terms of production and economic outlook • Demand and supply of mineral resources • Critical future issues in the mining industry • European mineral policies • Operational Excellence Framework

Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	Lectures, presentations, active participation and discussions
Further information	
Recommended reading	<ul style="list-style-type: none"> • British Geological Survey: World Mineral Production 2002 – 06/ L.E. Hetherington et.all. – Keyworth, Nottingham: British Geological Survey, 2008 • Ekdahl, E.: Mineral Resources in Europe, Presentation, International Symposium on the Planet Earth, Trondheim, 7-8 February 2008 • Nötstaller, R.: Patterns of Mineral Demand and supply global and regional perspectives, in: BHM – Berg- und Hüttenmännische Monatshefte, 147/2002, H.12, p.402 ff • Website of the European Union: Raw Materials
Note	<p>The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture.</p> <p>The latest version of the lecture notes will be uploaded at the beginning of the semester.</p>

Seminar in Mining Engineering and Mineral Economics

Course Nb	200.114
Credits	1,5
Type	Seminar
Lecturer	Hartlieb
Course description	
Content	This course aims at high-quality scientific working procedures, writing of thesis of publications as well as presentation of results. Students have a short introduction, and will then independently elaborate on a topic assigned, producing a report and presenting the findings to the audience)
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Basics of Mining and mining related processes
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to:</p> <ul style="list-style-type: none"> • Independently perform a mining related project • Write a report / thesis • Avoid plagiarism and fraud • Present findings
Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	<p>Lecture with exercises</p> <p>Independent course work with supervision and feedback sessions by lecturer</p>

Further information	
Recommended reading	<ul style="list-style-type: none">Guideline for Scientific Writing, Chair of Mining Engineering and Mineral Economics, Montanuniversitaet
Note	<p>The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture.</p> <p>The latest version of the lecture notes will be uploaded at the beginning of the semester.</p>

Sustainable Development: History of thought, basic concepts and current applications

Course Nb	200.098
ECTS	6
Type	Lecture
Lecturer	Grübler, Tost
Course description	
Content	<p>The class provides a basic introduction to the history and the multiple conceptual bases of Sustainable Development as well as its current applications across different social goals and industrial sectors. The class is divided into two main sections: history and concepts of Sustainable Development; and mining & other current SD applications. The two sections are taught jointly.</p> <p>In the history/concepts section, the concept of sustainable development is traced first to its origins (renewable resource management, conservation movement, human rights, Brundtland Commission, UN MDGs and SDGs). An overview of underlying fundamental concepts (e.g. soft vs. hard sustainability formulations, ecosystem services, planetary boundaries) from a multidisciplinary perspective including ethics, economics, social and environmental sciences is given.</p> <p>In the mining & current applications of sustainable development section, a historical perspective of mining development and current sustainability initiatives in extractive industries are reviewed. In addition, applied SD concepts</p>

	and principles, in particular the UN Sustainable Development Goals (SDGs) and ongoing extensions (e.g. The World in 2050 Initiative) are discussed. Throughout the class, special focus will be devoted to discuss the case of extractive industries.
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Basic understanding of mining and raw materials
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to:</p> <ul style="list-style-type: none"> • understand and differentiate the various concepts of sustainability and sustainable development • have a basic understanding of key components, i.e. the areas of the 17 SDGs, including e.g. climate change, poverty reduction and inequality • understand what SD means for mining and what role and contribution raw materials have in the context of SD • integrate SD considerations into project planning and assessment
Languages of instruction	English
Teaching and learning method	<ul style="list-style-type: none"> • Interactive lecture • Presentations and videos • Q&A, discussions • Case studies • Guest lectures

Assessment	<ul style="list-style-type: none"> • Written and oral: written exam (online) has to be passed in order to be admitted to the oral exam.
Further information	
Recommended reading	<ul style="list-style-type: none"> • The 17 Sustainable Development Goals https://sdgs.un.org/goals • https://www.undp.org/content/undp/en/home/librarypage/poverty-reduction/mapping-mining-to-the-sdgs--an-atlas.html
Note	<p>The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture.</p> <p>The latest version of the lecture notes will be uploaded at the beginning of the semester.</p>

2. Restricted Electives

Artisanal and Small-scale Mining in Developing Countries

Course Nb	200.149
ECTS	3
Type	Lecture
Lecturer	Hruschka
Course description	
Content	<p>The course covers the importance and the development potential of Artisanal and Small-scale Mining (ASM) as well as the severe problems of ASM with regards to technical, social, legal, political, economic and environmental aspects. Case studies from Latin America, Africa and Asia are used to illustrate the challenges and possible solutions.</p> <p>Starting out from a characterization of ASM as a poverty- as well as opportunity-driven activity of more than 40 million people in developing countries (chapter 1) and the typical ASM technology used by them (chapter 2), the course addresses the most important crosscutting key issues relevant for the ASM sector (chapter 3), such as environmental impacts and in particular mercury use, safety and occupational health, public health, child labour, gender, organization, legalization and formalization, coexistence with LSM, contribution to local development, climate change etc. Chapter 4 covers the interrelated key issues of conflict minerals, voluntary ASM standards- and certification initiatives, as well as the increasing relevance of legal requirements</p>

	<p>for responsible mineral supply chains based on the OECD Due Diligence Guidance. Chapter 5 deals with sustainable development-based strategies, approaches and instruments for ASM project planning and attempts to provide an outlook on future trends. The course concludes with an overview of relevant initiatives, institutions and further sources of information (chapter 6).</p>
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1)
Objective (expected results of study and acquired competences)	<p>On completion of this course, participants are expected to understand the differences and similarities of industrial mining and artisanal small-scale mining and the driving forces of communities and actors engaged in ASM. Participants shall be able to:</p> <ul style="list-style-type: none"> • resolve complex and multidisciplinary problems of ASM in developing countries. • analyze private or public development initiatives (by governments, mining companies or NGOs) for the ASM sector and anticipate their potential positive or negative effects.
Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	<p>Multimedia-supported lecture with case studies. Active participation and discussion</p>
Assessment	<ul style="list-style-type: none"> • Written and oral: Written exam (only if the lecture is face-to-face) and panel discussion (oral).

	During the panel discussions, the participants of the lecture are assessed whether they fulfill the learning objectives.
Further information	
Recommended reading	Electronic copies of relevant documents and articles will be provided
Note	<p>The most recently updated version of the lecture notes (PowerPoint presentation for each chapter) will be made available for download one week before the lecture.</p> <p>The assessment methods will be announced in detail in the first lecture.</p>

Continuous Mining Methods and Conveying Technologies in Surface and Underground Mining

Course Nb	200.111
ECTS	3
Type	Lecture
Lecturer	Berner, Bertignoll, Sifferlinger
Course description	
Content	<p>This is a general course about continuous mining methods and conveying technologies in surface and underground mining. The following topics will be covered:</p> <ul style="list-style-type: none"> • Basics of surface and underground mining • Surface Mining <ul style="list-style-type: none"> ○ Introduction ○ Bucket wheel excavator ○ Surface miner ○ Sizer/Breaker ○ Safety in surface mining • Underground mining <ul style="list-style-type: none"> ○ Introduction ○ Continuous mining in room and pillar (coal, salt, trona and potash) ○ Longwall mining methods ○ Continuous mining in hard rock ○ Safety in underground mining • Conveying technologies in surface and underground mining <ul style="list-style-type: none"> ○ Introduction ○ Overview continuous conveying technologies ○ Conveyor belt systems ○ Trucks and shuttle cars

	<ul style="list-style-type: none"> ○ Rail bound transport systems ○ Applications of conveying systems
Previous knowledge expected	<ul style="list-style-type: none"> ● Good English skills (Minimum: CEF Level B1) ● Basic Engineering Physics and Math (e.g. logarithms and power functions, equations, integrals, function analysis) ● Basic Mining Engineering ● Rock Mechanics
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to:</p> <ul style="list-style-type: none"> ● Understand and apply the basics of continuous surface and underground mining methods ● Explain the different surface and underground mining operations ● Differentiate between the mining and conveying methods by comparing the benefits and drawbacks, challenges and limitations
Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	Lecture
Further information	
Recommended reading	SME Mining Engineering Handbook – Peter Darling
Note	<p>The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture.</p> <p>The latest version of the lecture notes will be uploaded at the beginning of the semester.</p>

Excavation Engineering

Course Nb	200.059
Credits	3
Type	Lecture/Practical
Lecturer	Hartlieb, Sifferlinger
Course description	
Content	<p>This is a general course about rock blasting and how it is used in mining and civil engineering.</p> <p>The following topics will be covered:</p> <ul style="list-style-type: none"> • Basics of explosives engineering • Blast fragmentation control • Blasting in drifts and tunnels • Design of an underground drift blast • Cautious blasting • Sinking of shafts and development raises • Underground production blasting • Alternative fragmentation methods • Visit to industry (if possible):
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Basic Engineering Physics and Math (e.g. logarithms and power functions, equations, integrals, function analysis) • Basic Mining Engineering • Rock Mechanics
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall know about</p> <ul style="list-style-type: none"> • The role of rock blasting in raw materials extraction • The properties and proper use of explosives and initiation devices in rock blasting

	<ul style="list-style-type: none"> • Fragmentation; how to describe it and factors that influence it • Outlines about environmental influence of blasting like ground vibrations, fly rock and noxious gases • Different types of tunnel rounds and how to design in detail a tunnel round with a parallel hole cut • Blast damage in excavation contours and design principles to minimize this in tunnels and road cuts • Outlines of shaft sinking and raise driving • Different methods used in underground production blasting for various mining methods and required charging • Outlines of breakage methods like water jets, micro waves etc.
Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	<p>Lectures</p> <p>Group assignment, 2-3 students working together. (Design of an underground drift blast)</p> <p>Oral examinations</p> <p>Lecture attendance</p>
Assessment	Written exam
Further information	
Recommended reading	Lecture notes in pdf format
Note	<p>The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture.</p> <p>The latest version of the lecture notes will be uploaded at the beginning of the semester.</p>

German as a foreign language A1.1

Course Nb	641.549
Credits	4
Type	Lecture / Practical
Lecturer	Krauhs, Unterhauser
Course description	
Content	<ul style="list-style-type: none"> • Grundkenntnisse der deutschen Sprache • Grundgrammatik • einfache Routinesituationen (Begrüßen, Informationen über Personen geben, Vorschläge machen, Restaurantbesuch, Hobbys, Meinung äußern, Wegbeschreibung etc.)
Previous knowledge expected	Für Studierende ohne Vorkenntnisse
Objective (expected results of study and acquired competences)	<p>Die Studierenden können</p> <ul style="list-style-type: none"> • vertraute Ausdrücke und einfache Sätze aus dem persönlichen Umfeld verstehen und anwenden • -einfache Fragen in einer vertrauteren Situation und zur Befriedigung konkreter Bedürfnisse verstehen und beantworten • mit einfachen Mitteln in alltäglichen Situationen kommunizieren, wenn langsam gesprochen wird und die Gesprächspartner/innen zu helfen bereit sind.
Languages of instruction	German

German as a foreign language A2.1

Course Nb	641.550
ECTS	4
Type	Lecture/Practical
Lecturer	Krauhs, Unterhauser
Course description	
Content	<ul style="list-style-type: none"> • Ausbau des Vokabulars und grammatikalischer Strukturen • Grundgrammatik: reflexive Verben, Konjunktionen, Zeiten und Artikel • Themen: Arbeit, Beruf, Familie, Wohnen, Ernährung • Förderung des autonomen Lernens
Previous knowledge expected	<ul style="list-style-type: none"> • Deutsch A1.1
Objective (expected results of study and acquired competences)	<p>Die Studierenden können:</p> <ul style="list-style-type: none"> • vertraute Ausdrücke und einfache Sätze aus alltäglichen Situationen verstehen und anwenden • mit einfachen Mitteln kommunizieren, wenn die Gesprächspartner/innen langsam und deutlich sprechen und hilfsbereit sind • sich selbst und andere vorstellen • Fragen zu Personen stellen und beantworten (z.B. Familie, Freunde, Arbeit) • Entscheidungen mitteilen und Vorschläge machen • Hoffnungen, Ängste und Besorgnis ausdrücken kurze Briefe und Einladungen verfassen
Languages of instruction	German

Lab in Mine Ventilation

Course Nb	200.107
ECTS	1
Type	Practical
Lecturer	Nöger, Sifferlinger
Course description	
Content	<ul style="list-style-type: none"> • Numerical and analytical analysis of ventilation networks • Resistance, pressure drop & air flow • Fan performance and air flow calculations • Gas distribution and dilution analysis • Introduction in ventilation simulation software • Ventilation survey calculations
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Basic knowledge of: <ul style="list-style-type: none"> ○ Mine ventilation systems ○ Underground atmosphere ○ Ventilation surveys
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to</p> <ul style="list-style-type: none"> • perform simple ventilation network analysis, fan design for underground mines, evaluation ventilation survey data; gas dilution and environment calculation • set up of ventilation models with simulation software
Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	

Further information	
Recommended reading	McPherson, Malcolm J. Subsurface ventilation and environmental engineering. 2012
Note	<p>The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture.</p> <p>The latest version of the lecture notes will be uploaded at the beginning of the semester.</p>

Marine Mining

Course Nb	200.148
ECTS	2
Type	Lecture
Lecturer	Groß, Wamser
Course description	
Content	<ul style="list-style-type: none"> • Introduction in marine mining • Marine mining methods • Overview of marine mineral deposits • Geology and mining methods for different raw materials • Environmental impact • Marine mining regulations • International law of the sea • International dispute resolution • Safety regulations for offshore employment
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Basics of mechanical excavation methods, geology and mineralogy
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to</p> <ul style="list-style-type: none"> • Know the principles of marine mining methods depending on different geological requirements • Have a basic understanding of legal requirements for marine mining activities • Assess potential legal problems and know mechanics for dispute resolution
Languages of instruction	English

Teaching and learning method (delivery of skills) workload for students	Lectures Active participation and discussion
Further information	
Note	The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture. The latest version of the lecture notes will be uploaded at the beginning of the semester.

Mine Ventilation, Water Control, Infrastructure

Course Nb	200.106
Credits	3
Type	Lecture
Lecturer	Nöger, Sifferlinger
Course description	
Content	<ul style="list-style-type: none"> • Repetition of the basics of mine ventilation from BSc program including mine climate • Context of mine ventilation in the frame of mine design and layout • Basics of air flow mechanics and relevant physical laws • Basics and principles of mine ventilation including air flow principles in underground mining including ventilation laws • Analytical mine ventilation calculations • Numerical mine ventilation calculations, demonstration of ventilation software • Secondary ventilation including design and layout
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Mathematics 1 • Physics of airflow • Basics of Underground Mining
Objective (expected results of study and acquired competences)	<p>On completion of this course the participants shall be able to</p> <ul style="list-style-type: none"> • Understand why it is important to have a proper mine ventilation system • Know the work safety risks associated with insufficient mine ventilation

	<ul style="list-style-type: none"> • Apply principles of air flow physics to mine ventilation problems • Do analytical calculations of simple ventilation networks • Understand the algorithm which is typically used in mine ventilation software packages • Do the design and layout of a secondary ventilation system • Understand the influence of design parameters of secondary ventilation on the ventilation results
Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	Lectures Homework calculations Active participation and discussion
Further information	
Recommended reading	Mc Pherson M. J.: Mine Ventilation Handbook
Note	The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture. The latest version of the lecture notes will be uploaded at the beginning of the semester.

3. Free Electives

Introductory Mining I

Course Nb	200.099
ECTS	3
Type	Lecture/Practical
Lecturer	Haindl
Course description	
Content	<ul style="list-style-type: none"> • Introduction • History of mining • Terms, Definitions standards • Special case mining • Phases in mining • Geology and Mineralogy • Enhanced basics in Mining, Processing, Surveillance, Soil- and Rock mechanics • Future in Mining
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1)
Objective (expected results of study and acquired competences)	<p>The aim of this course is to give students, who do not have a mining background, an introduction and insight into mining.</p> <p>On completion of this course, the participants shall be able to:</p> <ul style="list-style-type: none"> • have a basic understanding of the above mentioned topics • be familiar with relevant terms and definitions
Languages of instruction	English

Teaching and learning method (delivery of skills) workload for students	Lectures Active participation, discussions Group assignment
Assessment	<ul style="list-style-type: none"> • Continuous assessment: Attendance (min. 70%) Two written exams (each 50%)
Further information	
Recommended reading	<ul style="list-style-type: none"> • Introductory mining engineering, Hartman, Howard L; Mutmanský, Jan M, 2002, 2. Ed
Note	<p>This course can only be attended by those AMRD students who have received it as a pre-condition for their admission.</p> <p>The assessment methods and the compulsory readings of this course will be announced in detail in the first lecture.</p> <p>The latest version of the lecture notes will be uploaded at the beginning of the semester.</p>

Introduction in Mining

Course Nb	200.096
ECTS	2,25
Type	Lecture
Offering period	Two weeks intensive course prior to the start of the wintersemester
Lecturer	Tscharf
Course description	
Content	<p>This two-weeks intensive course gives a basic introduction in:</p> <ul style="list-style-type: none"> • Excavation Engineering • Surface Mining Methods • Underground Hard Rock Mining Methods • Rock Mechanics • Rock and Rock Mass Parameters • Mine Ventilation • Mining Subsidence Engineering • Mine Surveying • Environmental Aspects of Mineral Extraction
Previous knowledge expected	<ul style="list-style-type: none"> • Good English skills (Minimum: CEF Level B1) • Background in mining or related fields, e.g.: <ul style="list-style-type: none"> ○ Tunneling ○ Mineral Processing ○ Geology ○ Environmental Engineering ○ Mine Surveying
Objective (expected results of study and acquired competences)	<p>The aim of this course is to give incoming students an insight into mining and into the requirements and focus of the courses of the mining study programs at Montanuniversität. On completion of this course, the participants shall</p>

	have a basic understanding of the above mentioned topics, be familiar with relevant terms and definitions and especially be prepared to attend lectures of the MA study programs at Montanuniversität.
Languages of instruction	English
Teaching and learning method (delivery of skills) workload for students	Lectures Active participation, discussions
Further information	
Recommended reading	<ul style="list-style-type: none"> • Introductory mining engineering, Hartman, Howard L; Mutmansky, Jan M, 2002, 2. Ed • SME Mining Engineering Handbook, Society for Mining, Metallurgy and Exploration
Note	<p>Two weeks intensive course prior to the start of the wintersemester.</p> <p>This course can only be attended by those AMRD students who have received it as a pre-condition for their admission.</p>