



**Master's Programme**

**„International Management of Resources and the Environment”  
(IMRE)**

***Module Handbook***

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## **Introduction**

### **Aims, Objectives, and Learning Outcomes of the Master Degree Course “International Management of Resources and the Environment” at the German-Mongolian Institute of Technology and Resources (GMIT)**

#### *Aims and Objectives*

The Master’s Course “International Management of Resources and Environment” is intended to impart essential knowledge of the relevant natural sciences and engineering and, above all, management with a dedicated focus on the natural resources and ecology.

Its objective is to qualify graduates of first cycle degrees in natural sciences and engineering to become knowledgeable about and acquainted with economics and business administration. This will focus on the natural resource sector, including mining and minerals processing, recycling, energy production and transformation in order to enable the graduates to pursue careers in natural resources and environment.

The studies take an interdisciplinary approach encompassing geo-sciences, ecology, mining engineering, law, economics and management. Students will therefore be trained in this interdisciplinary approach.

The course covers 4 semesters consisting of 120 credits.

#### *Qualification upon successful completion:*

Bringing both their experience in engineering or in the natural sciences, resulting from their studies at the Bachelor’s level, as well as their knowledge of economics and business administration combined with their deep insights into the natural resource sector acquired in this Master Degree Course, the graduates will be suited for many career opportunities in the natural resources and the energy sectors. In addition to this, they are also qualified for positions related to these sectors: including public administration (e.g. mining administrations, energy agencies), investment and financial organizations, equipment manufacturers and suppliers, logistics companies and consultants.

#### *Learning Outcomes*

The graduates of the second cycle degree course „International Management of Resources and the Environment” will be able to:

- Design strategic concepts for enterprises in the natural resource and the energy sectors
- Develop project management models for natural resources and energy projects
- Prepare assessments of environmental risks and their mitigation related to natural resource and energy projects
- Contribute to incorporating legal and regulatory requirements into natural resource and energy projects
- Prepare and assess financial reports related to natural resource and energy projects
- Work in interdisciplinary teams in order to achieve effective and ecologically sound business models for natural resources and management

#### *Admission Requirements:*

To be eligible for the Master’s programme in International Management of Resources and the Environment, students must have at least a Bachelor’s degree in an engineering or a natural sciences subject and proven proficiency in English at C1-level (IELTS, TOEFL or equivalent).

In order to be considered in the screening process, applicants must send the following documents:

- Diploma
- Transcript of records
- Proof of English proficiency at C1 level
- Statement of purpose/Letter of motivation
- (copy of passport)

All applications will be reviewed by a Selection Committee consisting of representatives of GMIT and German partner universities (Step 1). Applicants meeting the assessment criteria and considered to be eligible for the study program will be invited for an interview (Step 2).

#### Step 1:

- Assessment by the Selection Committee (members: GMIT and German partner Universities)
- Assessment/Selection criteria: estimated ability to finish the program successfully, academic profile, statement of purpose/motivation letter, if applicable: professional experience

#### Step 2:

- Personal interviews

The number of students to be admitted to the program is limited and is subject to negotiation with the Ministry each year.

**Study plan IMRE**

<b>MBA International Management of Resources and the Environment (IMRE)</b>			
1. Semester	2. Semester	3. Semester	4. Semester
Applied Economics 6 CP (2 UoIL, 2 UoIR)	Assessment and Management of Environmental Risks 6 CP (2 UoIL, 2 UoIR)	Sustainability Management 6 CP (2 UoIL, 2 UoIR)	Student Project on Management 6 CP (2 weeks + Excursion)
Accounting and Financial Reporting 6 CP (2 UoIL, 2 UoIR)	Investment and Finance for the Resource Sector 6 CP (2 UoIL, 2 UoIR)	Environmental Impact Studies 6 CP (2 UoIL, 2 UoIR)	Master Thesis 20 CP
Mining Technologies 4 CP (3 UoIL)	Mineral Economics 6 CP (3 UoIL, 2 UoIR)	Natural Resource and Energy Economics 6 CP (3 UoIL, 2 UoIR)	
Ecosystems Management 6 CP (2 UoIL, 2 UoIR/Field Trip)	Entrepreneurship 6 CP (2 UoIL, 3 UoIR)	Production Planning and Planning for the Resource Sector 6 CP (2 UoIL, 2 UoIR)	
Natural Resources of Mongolia and Investigation Methods 6 CP (1 UoI, 4 UoI Excurs./ Field Trip)	Law and Regulations of Resources and the Environment 6 CP (1 UoIL, 3 UoIR)	Strategic Management 6 CP (2UoIL, 2 UoIR)	
Electives 3 CP	Electives 3 CP		
CP	Credit Points		Economics, business and finance
UoI =	Unit of Instruction (45 min. per unit)		Advanced Resource Economics and Management
UoIL =	Unit of Instruction Lecture		Resources and the Environment
UoIR =	Unit of Instruction Recitation		Engineering
UoI.lab =	Unit of Instruction Laboratory		Electives
UoIExc =	Unit of Instruction Excursion		Thesis

## IMRE101 – Applied Economics

<b>Module Title</b>	Applied Economics			<b>Module-Code</b>	IMRE101
<b>Duration</b>	1 semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	1
<b>Credit points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	Prof. Dr. Bruno Schönfelder			<b>Language</b>	English
<b>Syllabus</b>	<p>The course is divided into three parts:</p> <ul style="list-style-type: none"> <li>• Microeconomics: Theory of companies and of households, markets, market failure, second-best solutions, equilibrium, uncertainty and risk, and economics of information</li> <li>• Macroeconomics: Economy and growth, open economies, economic growth, investment and savings, business cycles and monetary economics</li> <li>• Public finance theory of resource-rich national economies: Natural resource shocks and the economic cycles, theory of and evidence for the resource curse, optimal royalties and taxation, and case studies</li> </ul>				
<b>Learning outcomes</b>	<p>On successful completion of this module, the students should be able to:</p> <ul style="list-style-type: none"> <li>• recall the principles of Microeconomics</li> <li>• recall the principles of Macroeconomics</li> <li>• explain the concept of Public finance theory of resource rich national economies</li> <li>• explain and discuss the structure and the performance of economies as a whole</li> <li>• analyse and evaluate national welfare in a nation with a substantial natural-resources sector</li> <li>• assess and interpret the use and misuse of this welfare</li> </ul>				
<b>Literature</b>	<p>Ahlersten, Krister (2009): Essentials of Microeconomics. Ventus Publishing ApS.</p> <p>Cooper, Russell; John, Andrew (2011): Economics – Theory Through Applications. Melbourne Business School.</p> <p>Humphreys, Macartan; Sachs, Jeffrey D.; Stiglitz, Joseph E. (2007): Escaping the Resource Curse. Columbia University Press.</p> <p>Moss, David A. (2007): A Concise Guide to Macro-Economics. Harvard Business School Press.</p>				
<b>Form of teaching</b>	<p>Lecture (2 UoI)</p> <p>Recitation (2 UoI)</p>				
<b>Assessment methods</b>	Written examination (180 min) and academic performance				
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	None				

<b>Requirements for receiving credit points</b>	Passing the examinations
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.

## IMRE102 – Accounting and Financial Reporting

<b>Module Title</b>	Accounting and Financial Reporting			<b>Module-Code</b>	IMRE102
<b>Duration</b>	1 semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	1
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	N.N.			<b>Language</b>	English
<b>Syllabus</b>	<p>The students are introduced to and familiarised with the basic principles and concepts of accounting:</p> <ul style="list-style-type: none"> <li>• Recognition of costs (OPEX and CAPEX)</li> <li>• Cost accounting</li> <li>• Capital budgeting</li> <li>• Cash-flow statements</li> <li>• Income and expenditure statements</li> <li>• Valuation of assets</li> <li>• Liabilities, contingencies</li> <li>• Drafting balance sheets</li> <li>• Reporting standards</li> </ul>				
<b>Learning outcomes</b>	<p>On successful completion of this module, the students should be able to:</p> <ul style="list-style-type: none"> <li>• apply the main instruments of accounting, such as: identifying and tracking costs, cost accounting, the accounting process, cash-flow statements, income and expenditure statements, balance sheets</li> <li>• evaluate assets and liabilities</li> <li>• analyse and interpret financial documents</li> <li>• explain the economic performance of business operations and of companies</li> </ul>				
<b>Literature</b>	<p>Heisinger, Kurt; Hoyle, Joe (2007): Managerial Accounting. Flat World Knowledge.</p> <p>Roychowdhury, Prof. Sugata (2004): Introduction to Financial and Managerial Accounting. MIT OpenCourseWare: Massachusetts Institute of Technology.</p>				
<b>Form of teaching</b>	<p>Lecture (2 Uol)</p> <p>Recitation (2 Uol)</p>				
<b>Assessment methods</b>	Written examination (90 min) and academic performance				
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	None				
<b>Requirements for receiving credit points</b>	Passing the examinations				
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.				

## IMRE103 – Mining Technologies

<b>Module Title</b>	Mining Technologies			<b>Module-Code</b>	IMRE103
<b>Duration</b>	1 semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	1
<b>Credit Points</b>	4 CP	<b>Workload</b>	120 h	<b>Contact hours</b>	
				<b>Individual study</b>	
<b>Module Coordinator</b>	Prof. Dr. Carsten Drebenstedt			<b>Language</b>	English
<b>Syllabus</b>	tbd				
<b>Learning outcomes</b>	tbd				
<b>Literature</b>					
<b>Form of teaching</b>	Lecture 2 UoI Seminar 1 UoI				
<b>Assessment methods</b>	Written examination				
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	None				
<b>Requirements for receiving credit points</b>	Passing the examinations				
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.				

## IMRE104 – Ecosystems Management

<b>Module Title</b>	Ecosystems Management			<b>Module-Code</b>	IMRE104
<b>Duration</b>	1 semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	1
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	Dr. Martin Knippertz			<b>Language</b>	English
<b>Syllabus</b>	<p>In this module an ecosystem-based approach to resource management is used.</p> <p>The participants of this course will learn the theoretical background and the practical application of the following:</p> <ul style="list-style-type: none"> <li>• Introduction to Ecology</li> <li>• Ecological zonation, on a global and regional scale</li> <li>• Climatology (atmospheric circulation); Climate of Mongolia (precipitation, temperature, climate diagrams)</li> <li>• Soil Science (soils of Mongolia, properties, distribution)</li> <li>• Water, air related issues in Mongolia</li> <li>• Restoration ecology</li> <li>• Geotechnics in rehabilitation</li> <li>• Case studies: Mining rehabilitation; Air pollution (control)</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of this module, students should be able to:</p> <ul style="list-style-type: none"> <li>• describe basic ecological relationships</li> <li>• recognize special ecological issues in Mongolia, their causes and relationships</li> <li>• identify especially sensitive areas of the natural environment in Mongolia</li> <li>• describe the (management) options for restoration of ecological systems, taking into account the socioeconomic, political and cultural needs</li> <li>• describe and critically analyse social processes in relation to usage of resources and protection of the natural environment</li> <li>• develop ecological management strategies within a given case study</li> </ul>				
<b>Literature</b>	<p>Cunningham WP, Cunningham MA, Saigo B (2005): Environmental sciences: a global concern (8th ed.). McGraw-Hill. New York. 600pp.</p> <p>Lottermoser, B. (2010): Mine Wastes. Springer, Heidelberg, 400 p.</p> <p>Plaster, E. (2013): Soil Science and Management. Cengage Learning. 544 p.</p>				
<b>Form of teaching</b>	<p>Lecture (2 UoI)</p> <p>Seminar/ Field Trip (2 UoI)</p>				
<b>Assessment methods</b>	<p>Written examination for the lecture (90 min), academic performance, presentation</p>				
<b>Associated study programme</b>	<p>MBA International Management of Resources and the Environment</p>				
<b>Prerequisites for participation</b>	<p>Knowledge of Applied Geosciences recommended</p>				
<b>Requirements for receiving credit points</b>	<p>Passing the examinations</p>				
<b>Grading system</b>	<p>Written examination for the lecture (90 min), accounting for 50% of final grade</p> <p>Academic performance, presentation, accounting for 50% of final grade.</p>				

## IMRE105 – Natural Resources of Mongolia and Investigative Methods

<b>Module Title</b>	Natural Resources of Mongolia and Investigation Methods			<b>Module-Code</b>	IMRE105
<b>Duration</b>	1 semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	1
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	60 h
				<b>Individual study</b>	120 h
<b>Module Coordinator</b>	Prof. Dr. Rainer Herd			<b>Language</b>	English
<b>Syllabus</b>	<p>Lecture Part A:                      "Geology of Mongolia"                      This part of the lecture provides an overview of the geology of Mongolia. Topics are:</p> <ul style="list-style-type: none"> <li>- regional geodynamic evolution and tectonics</li> <li>- geological units of Mongolia, their distribution and properties</li> <li>- magmatic and volcanic activities over time</li> </ul> <p>Lecture Part B:                      "Resource potential and typical raw material deposits of Mongolia"                      This part of the lecture focusses on the resource potential of Mongolia. Derived from the geodynamic evolution and the local geological units, the potential for natural resources will be estimated. The distribution of energy raw materials, metals, industrial minerals, hard and soft rocks as well as ground water will be evaluated.                      Part A and B are supplemented by 3 one-day excursions to typical geological sites, raw material occurrences and active mines.</p> <p>Part C:                      "Investigative methods and techniques"                      The lecture provides an overview of the state-of-the-art investigative methods and techniques used for prospecting and the detection of raw materials and ground water. Methods and techniques such as: remote sensing, satellite and aerial image interpretation, seismic, electromagnetic, geoelectric, geomagnetic, radiometric investigations, as well as geochemical and geological methods will be considered.                      Part C is supplemented by a 3 day Field Training. The students will use different investigative methods in the field and will perform a small prospection campaign for a certain raw material.</p>				
<b>Learning Outcomes</b>	<p>On successful completion of the module, the student should be able to:</p> <ul style="list-style-type: none"> <li>• describe the geodynamic evolution of the region</li> <li>• differentiate the geological units and their distribution</li> <li>• estimate the resource potential of the different units and regions</li> <li>• describe the distribution of raw material deposits in Mongolia</li> <li>• recall the state-of-the-art investigative methods</li> <li>• explain the principles of the investigative methods and their field of application</li> </ul>				
<b>Literature</b>	<p>Evans, A. M. (1992): Ore Geology and Industrial Minerals. Blackwell. Oxford.</p> <p>Lillesand, T. M.; Kiefer, R. M.; Chipman, J. W. (2008): Remote sensing and image interpretation. Wiley. Hoboken.</p>				

	<p>Reynolds, J. M. (2011): An introduction to applied and environmental geophysics. Wiley-Blackwell. Chichester.</p> <p>Vogelsang, D. (1995): Environmental Geophysics. Springer. Berlin.</p>
<b>Form of teaching</b>	<p>Lectures (1 UoI)</p> <p>Excursion (2 UoI) / 3 days</p> <p>Field Training (2 UoI) / 3 days</p>
<b>Assessment methods</b>	<p>Written examination for the lecture (90 min), academic performance and report for the field training (8-10 pages)</p>
<b>Associated study programme</b>	<p>Master International Management of Resources and the Environment</p>
<b>Prerequisites for participation</b>	<p>Knowledge of Applied Geosciences recommended</p>
<b>Requirements for receiving credit points</b>	<p>Passing the examinations</p>
<b>Grading system</b>	<p>Written examination for the lecture (90 min), accounting for 50% of final grade</p> <p>Academic performance and report for the field training (8-10 pages), accounting for 50% of final grade.</p>

## IMREXXX – Electives

<b>Module Title</b>	Electives			<b>Module-Code</b>	IMREXXX
<b>Duration</b>	1 semester	<b>Semester</b>	Winter/Summer semester	<b>Module-Start</b>	1, 2
<b>Credit Points</b>	3 CP	<b>Workload</b>	90 h	<b>Contact hours</b>	
				<b>Individual study</b>	
<b>Module Coordinator</b>	N.N			<b>Language</b>	English
<b>Syllabus</b>	The students can chose between courses from disciplines such as <ul style="list-style-type: none"> <li>• language</li> <li>• non-technical</li> <li>• technical / engineering</li> </ul>				
<b>Learning Outcomes</b>					
Literature					
<b>Form of teaching</b>					
<b>Assessment methods</b>					
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	None				
<b>Requirements for receiving credit points</b>	Passing the examinations				
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.				

## IMRE106 – Law and Regulations of Resources and the Environment

<b>Module Title</b>	Law and Regulations of Resources and the Environment			<b>Module-Code</b>	IMRE106
<b>Duration</b>	1 semester	<b>Semester</b>	Summer semester	<b>Module-Start</b>	2
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	Part A: NN Part B: Prof Bongaerts / Prof. Drebenstedt			<b>Language</b>	English
<b>Syllabus</b>	<p>The module is divided into two parts. Part A consists of a lecture on the law and regulations of resources and the environment exclusively related to the Republic of Mongolia. In Part B, which is taught as a seminar, the focus of the topic will be on the international perspective.</p> <p>Students will learn the principles, the functioning and the interaction of the laws and regulations of the Republic of Mongolia with reference to natural resources and ecology. With this knowledge in mind, they will also learn the legal frameworks -- in various countries -- of laws related to mining and the administrative procedures regulating mining operations at all process stages, including the obligations of both public mining authorities and (private) companies in the natural resource sector. Given the involvement of international companies in the natural resource sector of the country, attention also focusses on the relevant international aspects of Mongolian law:</p> <ul style="list-style-type: none"> <li>• law on nature and environmental protection</li> <li>• law on the use of natural resources</li> <li>• law on mining</li> <li>• administrative law and procedures relating to the natural resources sector</li> <li>• company law related to internationally operating companies</li> <li>• law on international trade</li> <li>• law on international movements of capital and revenue</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of this module the students should be able to:</p> <ul style="list-style-type: none"> <li>• analyse the interaction between the law on nature and environmental protection, and the law on the use of natural resources</li> <li>• apply the law on mining and the relevant administrative procedures to the natural resources sector in all process stages (exploration, development, production, closure and rehabilitation)</li> <li>• assess the functioning and the obligations of international companies in the natural resource sector intending to operate or operating within Mongolia</li> </ul>				
<b>Literature</b>	<p>The Minerals Law of Mongolia (Amended Law) (30.10.2006): Lovells, Hogan (15.09.2014): Amendment to the Law of Mongolia on Minerals.</p> <p>Ellis, Elisabeth; Rosholt, Sebastian; Baasankhuu, Dunnaran; Tumurbaatar, Sundarya (2014): High Level Overview: Amendments to the Minerals Law (2006). MinterEllison.</p> <p>Davaasuren, Orgil (2015): The Amendments of 2013, 2014 and 2015 to the Law of Mongolia on Minerals (2006). Ashid Advocates LLP.</p> <p>U.S. Embassy in Mongolia, Department of State (06.2014): 2014 Investment Climate Statement.</p> <p>U.S. Embassy in Mongolia (05.2015): 2015 Investment Climate Statement.</p>				
<b>Form of teaching</b>	Lecture (1 Uol)				

	Seminar (3 UoI)
<b>Assessment methods</b>	Written examination for the lecture (90 min) and essay (8-10 p.) for the seminar and oral presentation (15 min)
<b>Associated study programme</b>	MBA International Management of Resources and the Environment
<b>Prerequisites for participation</b>	
<b>Requirements for receiving credit points</b>	Achieving a satisfactory evaluation of the seminar paper and presentation and passing the examination for the lecture
<b>Grading system</b>	The final grade consists of the examination for the lecture, accounting for 25%, the seminar paper, accounting for 60%, and the oral presentation accounting for 15%.

## IMRE107 – Investment and Finance for the Resource Sector

<b>Module Title</b>	Investment and Finance for the Resource Sector			<b>Module-Code</b>	IMRE107
<b>Duration</b>	1 semester	<b>Semester</b>	Summer semester	<b>Module-Start</b>	2
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	Prof. Dr. Jan C. Bongaerts			<b>Language</b>	English
<b>Syllabus</b>	<p>The participants of this course will learn the theoretical background and the practical application of the following:</p> <ul style="list-style-type: none"> <li>• Valuation of projects in the natural resources industry</li> <li>• Calculation of investment projects and their performance</li> <li>• Financial markets, Portfolio Theory, CAPM</li> <li>• Corporate finance for the natural resources industry</li> <li>• Real options analysis for natural resources projects</li> <li>• Non-conventional financing of natural resources projects</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>• specify requirements of fundraising for projects with a focus on the natural resources sector</li> <li>• assess the performance of projects</li> <li>• differentiate between classic and non-conventional financing means for all stages: exploration, preparation, production, closure and post-closure</li> </ul>				
<b>Literature</b>	<p>Rudenno, Victor (2012): The Mining Valuation Handbook. Wiley.                      Torries, Thomas F. (1998): Evaluating Mineral Projects: Applications and Misconceptions. Society for Mining, Metallurgy, and Exploration.</p>				
<b>Form of teaching</b>	<p>Lecture (2 UoI)  <del>Recitation-Tutorials</del> (2 UoI)</p>				
<b>Assessment methods</b>	<p>Written examination (90 min) course assignments, and academic performance</p>				
<b>Associated study programme</b>	<p>MBA International Management of Resources and the Environment</p>				
<b>Prerequisites for participation</b>	<p>None</p>				
<b>Requirements for receiving credit points</b>	<p>Passing the examinations</p>				
<b>Grading system</b>	<p>The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.</p>				

## IMRE108 – Mineral Economics

<b>Module Title</b>	Mineral Economics			<b>Module-Code</b>	IMRE108
<b>Duration</b>	1 semester	<b>Semester</b>	Summer semester	<b>Module-Start</b>	2
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	60 h
				<b>Individual study</b>	120 h
<b>Module Coordinator</b>	F. M. Meyer			<b>Language</b>	English
<b>Syllabus</b>	<p>Students will receive a good overview of the theory of mineral economics and the relevant applications as follows:</p> <ul style="list-style-type: none"> <li>• Overview on economic geology (ore deposit geology)</li> <li>• Properties and derived demand of minerals (metallic minerals, energy minerals, industrial minerals)</li> <li>• Overview on mineral extraction technologies (open-cast and underground mining, under-water mining, seabed mining, non-conventional technologies)</li> <li>• Mining and economic development</li> <li>• Reporting of exploration results (JORC Code)</li> <li>• Geological factors affecting recovery and value</li> <li>• Cash flow, net present value</li> <li>• Net smelter return</li> <li>• Cut-off grade</li> <li>• Depletion and scarcity</li> <li>• Demand and supply</li> <li>• Markets and prices</li> <li>• Public policy, rents and taxation</li> <li>• Mineral commodity trade and comparative advantage in mining</li> <li>• Market power and competition policy</li> <li>• The environment and sustainable development in the mineral industry</li> <li>• Risk analysis</li> <li>• Overview of costs in the base metal and gold mining industries</li> <li>• Depletion and the long-term availability of mineral commodities</li> <li>• The competitive position of countries seeking exploration and development investment</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>• describe the principles of economic geology</li> <li>• recall mineral extraction technologies</li> <li>• recall the need for minerals and the principle of derived demand</li> <li>• recognize the economic specifics of minerals</li> <li>• recall all aspects of exploration, production, use, recycling</li> <li>• recall reporting of exploration results, resources and reserves</li> <li>• assess and evaluate the implications of resource depletion and scarcity</li> <li>• assess the significance of minerals in resource-rich economies and in industrial uses</li> <li>• explain the mineral commodity trade</li> <li>• explain the operation of markets</li> <li>• recall aspects of public policy, rents and taxation</li> </ul>				
<b>Literature</b>	<p>Doggett, M.D.; Parry, J.R. (Editors) (2006): Wealth Creation in the Minerals Industry: Integrating Science, Business, and Education. SOCIETY OF ECONOMIC GEOLOGISTS, INC. Special Publication Number 12.</p>				

	<p>Pohl, Walter J. (2011): Economic Geology – Principles and Practice. Wiley - Blackwell.</p> <p>Stone, John G.; Dunn, Peter G. (Editors) (1994): Ore Reserve Estimates in the Real World. SOCIETY OF ECONOMIC GEOLOGISTS, INC. Special Publication Number 3.</p> <p>Tilton, John E.; Guzmán, Juan Ignacio (2016): Mineral Economics and Policy. Routledge.</p>
<b>Form of teaching</b>	<p>Lecture (3 Uol)</p> <p>Recitation (2 Uol)</p>
<b>Assessment methods</b>	Written examination (90 min) and academic performance
<b>Associated study programme</b>	MBA International Management of Resources and the Environment
<b>Prerequisites for participation</b>	None
<b>Requirements for receiving credit points</b>	Passing the examinations
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 50%, and the module examination accounting for 50%.

## IMRE109 – Entrepreneurship

	Entrepreneurship			<b>Module-Code</b>	IMRE109
<b>Duration</b>	1 semester	<b>Semester</b>	Summer semester	<b>Module-Start</b>	2
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	60 h
				<b>Individual study</b>	120 h
<b>Module Coordinator</b>	Prof. Dr. Jan C. Bongaerts			<b>Language</b>	English
<b>Syllabus</b>	<p>The participants of this module will learn to identify the entrepreneurial skills for bringing a business idea to business practice.</p> <p>They will learn:</p> <ul style="list-style-type: none"> <li>to develop business ideas, team building and networking, creativity and presentation skills</li> <li>to mobilize resources to bring ideas to fruition</li> <li>to develop the practical issues: business plan, finance, customer identification, market research, product launch</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>develop themselves as entrepreneurs</li> <li>use key instruments in business set-up: product development, market research, financial models (cash flow projections), team building</li> <li>present business models and financial plans to investors</li> <li>secure the required resources for the new business</li> <li>use the administrative and legal requirements for setting up and maintaining a business</li> </ul>				
<b>Literature</b>	<p>Gerber, Michael E. (2004): The E-Myth Revisited: Why Most Small Businesses Don't Work and What to Do About It. HarperCollins.</p> <p>Ries, Eric (2011): The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business.</p> <p>Thiel, Peter; Masters, Blake (2014): Zero to One: Notes on Startups, or How to Build the Future. Crown Business / Random House Audio.</p>				
<b>Form of teaching</b>	<p>Lecture (2 UoI)</p> <p>Recitation (3 UoI)</p>				
<b>Assessment methods</b>	<p>Written examination (90 min) and academic performance (case studies and team work)</p>				
<b>Associated study programme</b>	<p>MBA International Management of Resources and the Environment</p>				
<b>Prerequisites for participation</b>	<p>None</p>				
<b>Requirements for receiving credit points</b>	<p>Passing the examinations</p>				

<b>Grading system</b>	The final grade consists of grade of the examination, accounting for 30%, and the assessment of the case studies and team work accounting for 70 %.
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## IMRE110 – Assessment and Management of Environmental Risks

<b>Module Title</b>	Assessment and Management of Environmental Risks			<b>Module-Code</b>	IMRE110
<b>Duration</b>	1 semester	<b>Semester</b>	Summer semester	<b>Module-Start</b>	2
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	Prof. Dr. Jan C. Bongaerts			<b>Language</b>	English
<b>Syllabus</b>	<p>Students of this module will become familiar with the concepts of risk's definition and of the identification and evaluation of risks with a focus on environmental risks. They will learn the fundamental approach towards risk in all important dimensions, starting with risk identification and modelling, assessing its importance (in terms of hazardousness to various receptors), its management through prevention, damage limitation or damage repair and clean-up, and ending with documentation and communication. The assessment and management of risk is considered to be a process with the following steps:</p> <ul style="list-style-type: none"> <li>• Definitions of (environmental and health and safety) risks</li> <li>• Risk modelling</li> <li>• Toxicity</li> <li>• Evaluation of risks</li> <li>• Risk and legislation</li> <li>• Risk management</li> <li>• Risk and communication</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>• describe the fundamental properties of risk</li> <li>• identify, measure and model risk and evaluate risk,</li> <li>• set up a proper management of risk and relate environmental and safety risks to industrial activities</li> </ul>				
<b>Literature</b>	<p>Calow, Peter P. (1997): Handbook of Environmental Risk Assessment and Management. Wiley-Blackwell.</p> <p>Fjeld, Robert A.; Eisenberg, Norman A.; Compton, Keith L. (2007): Quantitative Environmental Risk Analysis for Human Health. Wiley.</p>				
<b>Form of teaching</b>	<p>Lecture (2 UoI)</p> <p>Recitation (2 UoI)</p>				
<b>Assessment methods</b>	<p>Written examination (90 min), course case study, and academic performance</p>				
<b>Associated study programme</b>	<p>MBA International Management of Resources and the Environment</p>				
<b>Prerequisites for participation</b>	<p>None</p>				

<b>Requirements for receiving credit points</b>	Passing the examinations
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.

## IMRE201 – Sustainability Management

<b>Module Title</b>	Sustainability Management			<b>Module-Code</b>	IMRE201
<b>Duration</b>	1 semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	3
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	Prof. Dr. Jan C. Bongaerts			<b>Language</b>	English
<b>Syllabus</b>	<p>Students learn the concepts of sustainability management within the triangle of economy, environment and society.</p> <ol style="list-style-type: none"> <li>1. The concept of sustainability</li> <li>2. Conceptual and theoretical foundations of sustainability</li> <li>3. Environmental impact studies</li> <li>4. Stakeholder management</li> <li>5. Compliance management</li> <li>6. Sustainability indicators and reporting standards</li> <li>7. Sustainability in mining operations</li> <li>8. Case studies on sustainability in mining operations</li> </ol>				
<b>Learning Outcomes</b>	<p>On successful completion of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>• recall sustainability indicators</li> <li>• examine the measurement of sustainability in businesses through indicators,</li> <li>• develop sustainability reporting standards</li> <li>• apply strategic best practices for sustainability</li> <li>• carry out case studies on mining operations</li> <li>• design sustainability concepts for natural resource projects and assess their feasibility and their social acceptance within an environmentally sound setting</li> </ul>				
<b>Literature</b>	<p>Spitz, Karlheinz; Trudinger, John (2008): Mining and the Environment: From Ore to Metal. Taylor &amp; Francis Ltd.</p> <p>Botin, J.A. (2009): Sustainable Management of Mining Operations. Society for Mining, Metallurgy, and Exploration</p>				
<b>Form of teaching</b>	<p>Lecture (2 UoI)</p> <p>Recitation (2 UoI)</p>				
<b>Assessment methods</b>	Written examination (90 min) and academic performance				
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	None				
<b>Requirements for receiving credit points</b>	Passing the examinations				
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.				

## IMRE202 – Environmental Impact Studies

<b>Module Title</b>	Environmental Impact Studies			<b>Module-Code</b>	IMRE302
<b>Duration</b>	1 Semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	3
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	N.N.			<b>Language</b>	English
<b>Syllabus</b>	<p>Students taking this module learn the theory and application of environmental impact assessment; one of the most fundamental instruments of environmental management, as follows:</p> <ul style="list-style-type: none"> <li>• Definitions of important concepts related to Environmental Impacts and Environmental Impact Studies (EIS)</li> <li>• Procedural matters of EIS, contents of EIS, completeness, accuracy</li> <li>• Obligations of the public authority</li> <li>• Obligations of the project developer</li> <li>• Criteria for the selection of projects for a generally obligatory EIS and for an EIS on a case-by-case basis</li> <li>• Criteria for identifying the environmental impacts of projects</li> <li>• Administrative procedure for the completion of an EIS</li> <li>• Allocation of the costs for performing an EIS</li> <li>• Possibility for judicial review of the decisions taken by a public authority</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of this module, the students should be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the essentials of an EIS from the viewpoint of contents and procedures</li> <li>2. Analyse and evaluate an EIS with respect to relevant criteria set by law or other relevant standards (e.g. World Bank and other development banks)</li> <li>3. Interpret the outcomes of EIS with their relevance for actual subsequent project development and project operation</li> <li>4. Competently participate in an EIS procedure on behalf of a project developer</li> </ol>				
<b>Literature</b>	<p>Gilpin, Alan (1994): Environmental Impact Assessment: Cutting Edge for the 21st Century. Cambridge University Press.</p> <p>Jain, Ravi K.; Urban, L. V.; Stacey, Gary S.; Balbach, Harold E. (2001): Environmental Assessment. (2<sup>nd</sup> Ed.). McGraw-Hill. New York.</p>				
<b>Form of teaching</b>	<p>Lecture (2 UoI)</p> <p>Recitation (2 UoI)</p>				
<b>Assessment methods</b>	Written examination (120 min) and academic performance				
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	None				
<b>Requirements for receiving credit points</b>	Passing the examinations				
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.				

## IMRE203 – Strategic Management

<b>Module Title</b>	Strategic Management			<b>Module-Code</b>	IMRE203
<b>Duration</b>	1 semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	3
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	N.N.			<b>Language</b>	English
<b>Syllabus</b>	<p>Students of this module will be instructed in the main elements of strategy development and strategy management for companies, especially those in the natural resources sector.</p> <ul style="list-style-type: none"> <li>• What is a strategy?</li> <li>• Strategic purpose, resources</li> <li>• Business and corporate strategy</li> <li>• Strategy development</li> <li>• International strategy</li> <li>• Strategy and culture</li> <li>• Strategies for commodities</li> <li>• Strategies of international mineral companies</li> <li>• Case studies</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>• identify and set up strategies with a focus on long-term and sustainable development</li> <li>• apply internal organizational structures of a corporation to design a strategy in accordance with external factors</li> <li>• apply appropriate elements of strategic development to the natural resources sector</li> </ul>				
<b>Literature</b>	<p>Johnson, Gerry; Scholes, Keavan; Whittington, Richard (2008): Exploring Corporate Strategy (8th Ed.). Prentice Hall. Pearson Imprint.</p> <p>MacIntosh, Robert; MacLean; Donald (2015): Strategic Management – Strategies at Work. Palgrave MacMillan.</p>				
<b>Form of teaching</b>	<p>Lectures (2 UoI)</p> <p>Recitation (2 UoI)</p>				
<b>Assessment methods</b>	Written examination (120 min) and academic performance				
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	None				
<b>Requirements for receiving credit points</b>	Passing the examinations				
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.				

## IMRE204 – Production Planning and Planning for the Resource Sector

<b>Module Title</b>	Production Planning -and Planning for the Resource Sector			<b>Module-Code</b>	IMRE204
<b>Duration</b>	1 semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	3
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	Prof. Dr. Jan C. Bongaerts			<b>Language</b>	English
<b>Syllabus</b>	<p>Students will learn the theoretical concepts of production planning and apply them to projects and operations in the natural resource sector.</p> <p>Part 1: Projects for the natural resource sector</p> <ul style="list-style-type: none"> <li>• Project planning and management</li> <li>• PERT, CPM,</li> <li>• Budget-restricted project planning</li> <li>• Time-restricted project planning</li> <li>• Combined time-restricted and budget-restricted project planning</li> <li>• Project performance monitoring and management</li> <li>• Costing of project planning</li> </ul> <p>Part 2 Production in the natural resource sector</p> <ul style="list-style-type: none"> <li>• Production processes</li> <li>• Capacity planning</li> <li>• Inventory management</li> <li>• Materials requirements planning</li> <li>• ERP (Enterprise resources planning)</li> <li>• Lean management</li> <li>• Internal and external logistics</li> <li>• Performance monitoring and control</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of this module, students should be able to:</p> <ul style="list-style-type: none"> <li>• Design and set up a project</li> <li>• Plan and operate a project</li> <li>• Use instruments for project planning and management</li> <li>• Apply budgetary limitations in project management</li> <li>• Monitor project performance</li> <li>• Design and set up a production process</li> <li>• Plan capacity for the process (ERP)</li> <li>• Apply instruments for materials requirement and inventory</li> <li>• Apply instruments for internal and external logistics</li> <li>• Monitor process performance</li> <li>• Take corrective action</li> </ul>				
<b>Literature</b>	<p>Mukhopahyay, S. K. (2007): Production Planning and Control. PHI Learning.</p> <p>Jacobs, F. Robert; Berry, William Lee; Whybark, David Clay (2010): Manufacturing Planning and Control for Supply Chain Management (6th Ed.). McGraw-Hill Education.</p> <p>Roberts, Paul (2013): Guide to Project Management. The Economist.</p>				

	Bhattacharya, Jayanta (2003): Principles of Mine Planning. Allied Publishers Pvt. Ltd. (Department of Mining Engineering, India Institute of Technology, Kharagpur).
<b>Form of teaching</b>	Lecture (2 UoI) Recitation (2 UoI)
<b>Assessment methods</b>	Written examination (120 min), course assignments, and academic performance
<b>Associated study programme</b>	MBA International Management of Resources and the Environment
<b>Prerequisites for participation</b>	None
<b>Requirements for receiving credit points</b>	Passing the examinations
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 15%, assignments accounting for 15 %, and the module examination accounting for 70%.

## IMRE205 – Natural Resource and Energy Economics

<b>Module Title</b>	Natural Resource and Energy Economics			<b>Module-Code</b>	IMRE205
<b>Duration</b>	1 semester	<b>Semester</b>	Winter semester	<b>Module-Start</b>	3
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	48 h
				<b>Individual study</b>	132 h
<b>Module Coordinator</b>	Prof. Dr. Jan C. Bongaerts			<b>Language</b>	English
<b>Syllabus</b>	<p>Students will learn the economics of optimal natural resources extraction for depletable and renewable resources as a theoretical concept with applications to practical situations</p> <ul style="list-style-type: none"> <li>• Classification of natural resources</li> <li>• Economics of optimal extractions modelling</li> <li>• Environmental economics</li> <li>• Energy economics</li> <li>• Natural resources markets</li> <li>• Energy markets</li> <li>• Recycling markets</li> </ul>				
<b>Learning Outcomes</b>	<p>On successful completion of this module, the students should be able to:</p> <ul style="list-style-type: none"> <li>• describe the economics of optimal natural resources extraction for depletable and renewable resources</li> <li>• identify current and future demands</li> <li>• use discount factors</li> <li>• explain the significance of technological progress</li> <li>• analyse environmental impacts of resource extraction and apply these models to energy resources, markets for natural resources and recycling</li> </ul>				
<b>Literature</b>	<p>Conrad, Jon M. (2010): Resource Economics. Cambridge University Press. New York.</p> <p>Kesler, Stephen E.; Arbor, Ann; Simon, Adam C. (2015): Mineral Resources, Economics and the Environment. Cambridge University Press.</p>				
<b>Form of teaching</b>	<p>Lecture (2 UoI)</p> <p>Recitation (2 UoI)</p>				
<b>Assessment methods</b>	Written examination (90 min) and academic performance				
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	None				
<b>Requirements for receiving credit points</b>	Passing the examinations				
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.				

## IMRE206 – Student Project on the Ecology of Mongolia

<b>Module Title</b>	Student Project on the Ecology of Mongolia			<b>Module-Code</b>	IMRE206
<b>Duration</b>	1 semester	<b>Semester</b>	Summer semester	<b>Module-Start</b>	4
<b>Credit Points</b>	6 CP	<b>Workload</b>	180 h	<b>Contact hours</b>	88 h
				<b>Individual study</b>	92 h
<b>Module Coordinator</b>	Dr. Martin Knippertz			<b>Language</b>	English
<b>Syllabus</b>	<p>Basic content and working methods for ecological problems, including the socioeconomic, political and cultural approaches. Training for moderating (panel) discussions.</p> <p>Project field work/ case studies; including laboratory work and investigations.</p>				
<b>Learning Outcomes</b>	<p>On successful completion of this module, students should be able to:</p> <ul style="list-style-type: none"> <li>• describe a given ecological problem, including the ecological relationships</li> <li>• summarise and apply sampling strategies (for soil/ water/ air pollution)</li> <li>• apply laboratory methods in order to evaluate the obtained data on soil/ water/ air pollution</li> <li>• describe the common techniques used in ecological restoration</li> <li>• develop a concept for ecological restoration</li> <li>• recall strategies for moderating discussions</li> </ul>				
<b>Literature</b>	<p>van Andel J.; Aronson J (2012): Restoration Ecology: the new frontier. Blackwell Publishing. Chichester. 381pp.</p> <p>Cunningham WP, Cunningham MA, Saigo B (2005): Environmental sciences: a global concern (8th ed.). McGraw-Hill. New York. 600pp.</p> <p>Plaster, E. (2013): Soil Science and Management. Cengage Learning. 544 p.</p>				
<b>Form of teaching</b>	Project course (project work of 2 weeks and 1-2 days excursion)				
<b>Assessment methods</b>	Written report and oral presentation for the module examination and academic performance				
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	Knowledge of Applied Geosciences, Ecosystem Management				
<b>Requirements for receiving credit points</b>	Successful working in the team and passing the examinations				
<b>Grading system</b>	The final grade consists of the academic performance during the module, accounting for 30%, and the module examination accounting for 70%.				

## IMRE207 - Master Thesis

<b>Module Title</b>	Master Thesis			<b>Module-Code</b>	IMRE207
<b>Duration</b>	1 semester	<b>Semester</b>	Summer semester	<b>Module-Start</b>	4
<b>Credit Points</b>	24 CP	<b>Workload</b>	600 h + 120 h	<b>Contact hours</b>	
				<b>Individual study</b>	
<b>Module Coordinator</b>				<b>Language</b>	English
<b>Syllabus</b>	Current research topic from a specific research area				
<b>Learning Outcomes</b>	<p>On successful completion of the Masters' thesis, students should be able to:</p> <ol style="list-style-type: none"> <li>1. Answer scientific questions in a structured manner using interdisciplinary methods of science, technology and business administration</li> <li>2. Critically evaluate and assess outcomes</li> <li>3. Apply outcomes to practical and real-life problems.</li> <li>4. Present results in written and oral forms in a scientifically acknowledged manner.</li> </ol>				
<b>Literature</b>	Depending on topic				
<b>Form of teaching</b>	Thesis supervision				
<b>Assessment methods</b>	Written thesis (14 weeks writing period) and defence -(30 min presentation followed by a 30 min discussion)				
<b>Associated study programme</b>	MBA International Management of Resources and the Environment				
<b>Prerequisites for participation</b>	Completion of third semester and at least 90 CP earned				
<b>Requirements for receiving credit points</b>	Passing the thesis and the presentation				
<b>Grading system</b>	The final grade for the Master thesis consists of the grade of the thesis and the grade performance in the thesis defence with a weighting of 4:1, provided that the thesis was graded as “passed” (1.0).				