



### **6.10.84E Implementation Regulations for the Master Studies in Mining Engineering at the Clausthal University of Technology, Faculty of Energy and Economics as of June 22, 2021**

The Faculty of Energy and Economics agreed on the following implementation regulations on June 22, 2021, in accordance with § 7 para 3 in relation with § 44 para 1 of the Higher Education Act of Lower Saxony (NHG). They were approved by the Presidential Board of Clausthal University of Technology on July/13/2021 (Notifications TUC 2021, page 412).

#### **Preamble**

These implementation regulations solely apply in relation with the General Exam Regulations (APO) of the TU Clausthal in the respectively valid version, and contain all programme-specific additions, amendments and regulations.

#### **Objective of the Study Programme**

Graduates of the Master's degree programme in Mining Engineering will be able to develop possible solutions on basis of a case analysis and critically evaluate them considering sustainable mining practice. In this way, they find solutions for specific cases in the field of raw material extraction and can explain their decisions in a reflective manner.

Based on the competences of the Bachelor's degree programme, they use quantitative and qualitative methods of scientific work and practice-oriented work, especially in the areas of laboratory work and software. For this purpose, graduates also use different methods of project management and target group-oriented communication in an interdisciplinary and intercultural environment. The methods applied here are based on the specialist culture of the disciplines represented.

Graduates work as specialists and managers in business, science or the public sector dealing with engineering tasks of the future relating to the national and international extraction of raw materials. It includes all areas from exploration to post-mining as well as adjacent fields of application, especially the supply industry of the raw materials sector. Competency as well as individual specialisation, which is ensured by the choice of elective subjects and topics of the Student Research Project and the final thesis, provides the qualification for this wide field.

## **On § 5**

### **Programme-specific implementation regulations**

The Master's programme in Mining Engineering has a modular structure. Annex 1 (module overview) lists the credit points (CP) assigned to individual modules in accordance with ECTS (European Credit Transfer System) as well as the type and scope of academic and/or examination requirements.

Annex 2 contains a model study plan, which represents the recommended course of study.

A detailed description of the modules and detailed information on their contents can be found in the separate module handbook.

## **On § 6**

### **Duration and structure of the programme, performance assessment**

The studies can be started in the winter and summer semester. The model study plan is set to begin in the winter semester. Beginning of the programme in the summer semester and compliance with the regular study time requires an increased study effort.

The standard period of study of the fulltime Master's programme, including the Master's thesis, is 4 semesters. The scope of the Master's programme equates to a total of 120 credit points, including 24 CP for the Master's thesis including colloquium.

An 8-week preliminary internship must be completed before starting the degree programme. Further details are regulated by the General Internship Guideline of Clausthal University of Technology in conjunction with the internship regulations for the Master's degree programme in Mining Engineering in its currently valid version.

## **On § 10**

### **Admission to the examination**

The module selection is binding with the first test attempt in one of the optional compulsory modules. A change of optional compulsory module is only possible if no attempts have been made or are deemed to have been made in an optional compulsory module.

## **On § 13**

### **Structure of the examinations, additional examinations and conditional examinations**

The Master's examination consists of the module or partial module examinations in the compulsory and elective modules in accordance with Annex 1 and submission of a Master's thesis in accordance with § 16 APO.

The elective compulsory module catalogue can be updated once a year by resolution of the Faculty Council. Changes made to elective compulsory module catalogues, are published by the study centre by the end of August for the next academic year (winter/summer semester). Changes will be published in exceptional cases by the end of February for the following summer semester:

<https://www.tu-clausthal.de/studieninteressierte/studiengaenge/master-studiengaenge/mining-engineering>

The admission to module and/or partial module examinations as well as proof of performance can stipulate unrestrictedly repeatable admission requirements (so-called preliminary examinations). Annex 1 lists all compulsory preliminary examinations (module overview).

All examinations must be taken in English.

### **On § 14 Types of study and examination achievements**

Annex 1 (module overview) lists the types of study and examination achievements. If, at the examiner's discretion, different forms of examination are to be taken, each examiner shall specify and announce the possible types of examination listed in Annex 1 (module overview) and, if applicable, the permitted auxiliary means during the first lecture. For written and oral exams (see § 15 section 3 and 4 APO), the duration of the examination is defined in the module manual.

### **On § 16 Final thesis**

The Master's thesis, including the colloquium, comprises 24 credit points and is to be completed in a period of 5 months. Upon application to the Examination Committee and approval of the primary examiner, this period may be extended to a total duration of 7.5 months in justified exceptional cases.

According to § 10 APO the Master's thesis requires a separate admission. When submitting the application, the primary examiner must be indicated.

The examiner must belong to the university lecturer group of the TU Clausthal and his or her department must be listed below:

- Institute of Mining
- Institute of Geo-Engineering
- Institute of Geology
- Institute for Repository Research
- Institute for Processing, Landfill Engineering and Geomechanics
- Institute for Software and Systems Engineering
- Institute for Mechanical Process Engineering
- Institute for Mechanical Engineering
- Institute of Geophysics
- Institute of Subsurface Energy Systems

- Institute of Economics

Justified exceptions are granted by the Examination Committee.

Admission to the Master's thesis is granted to students who, in addition to the admission requirements according to § 10 APO, have a total of at least 84 credit points. Justified exceptions are granted by the Examination Committee.

The assessment of the module examination Master's thesis consists of 80 % of the written examination part and 20 % of the oral examination part (colloquium).

### **On § 18 Assessment of examination results, grading**

The weighing of the individual modules for final grade of the Master's examination is carried out in accordance with Annex 1 (module overview).

### **On § 22 Default, Fraud, Exceptions**

The Master studies course is not suited for part-time students.

### **On § 33 Entry Into Force**

These Implementation Regulations come into force on the day after their announcement in the official gazette of Clausthal University of Technology at the beginning of the examination period of the winter semester 2021/22.

### **Transitional provisions to these Implementation Regulations from 22.06.2021**

(1) Students starting their Master's programme in Computer Science from the winter semester 2021/2022 onwards shall be examined in accordance with this version of the Implementation Regulations.

(2) Students who are in the second or a higher semester in this study programme when these implementation regulations come into force may complete the Master's programme in this study programme according to the implementation regulations of 16.09.2014 in the version of the 6th amendment of 22.06.2021 until the end of the examination period of the winter semester 2023/2024. Upon application it is possible to change and let these Implementation Regulations apply. The application must be submitted to the Examinations Office before the application for admission to the thesis at the latest.

(3) Students who have enrolled in the study programme in the summer semester 2021 are recommended to transfer to this version of the implementation regulations.

## Annex 1: Modules of the Master's Programme in Mining Engineering

<b>Compulsory modules</b>							
The module listed below must be completed with 108 credit points.							
Description of the module or course	Course-No.	Type of course,S WS	CP	Form of examination	Weighting	Graded ?	Type of examination
<b>Module 1: Shaft Sinking and Advanced Ventilation</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
Shaft Sinking	W 6984	1V	2	K or M	0,5	grad.	MTP
Tutorial for Shaft Sinking	W 6985	1Ü	1				
Advanced Mine Ventilation and Climatization	S 6986	2V	3	K or M	0,5	grad.	MTP
<b>Module 2: International Mining</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
International Mining	W 6029	1V	2	M	0,5	grad.	MTP
Seminar for International Mining	W 6029	1S	1				
Mining and Finance	W 6017	1V	2	PA	0,5	grad.	MTP
Tutorial for Mining and Finance	W 6017	1Ü	1				
<b>Module 3: Geomatics</b>		<b>5</b>	<b>6</b>		<b>6/120</b>		
GIS-based spatio-temporal analysis and modeling	W 6309	2V/1Ü	3	K or M	0,5	grad.	MTP
Remote Sensing	S 6354	1V/1Ü	3	K or M	0,5	grad.	MTP
<b>Module 4: Mineral Resources</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
Economic Geology	S 6220	2V	3	K or M	0,5	grad.	MTP
Geostatistics	W 4637	2V	3	K or M	0,5	grad.	MTP
<b>Module 5: IoT and Digitalization for Circular Economy</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
IoT and Digitalization for Circular Economy	W 1637	3V/1Ü	6	K or M	1	grad.	MP
<b>Module 6: Underground Mining Equipment</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
Underground Mining Equipment	W 6989	3V	4	K	0,75	grad.	MTP
Project on Underground Mining Equipment	W 6991	1S	2	PA	0,25	grad.	MTP
<b>Module 7: Advanced Rock Mechanics</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
Advanced Rock Mechanics	S 6260	2V	3	K	1	grad.	MP
Tutorial for Advanced Rock Mechanics	S 6251	2Ü	3				
<b>Module 8: Mining and Environment</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
Mining and Environment	W 6068	2V	4	K or M	1	grad.	MP
Tutorial Mining and Environment	W 6078	2Ü	2				

<b>Module 9: Mineral Processing</b>		<b>3</b>	<b>4</b>		<b>4/120</b>		
Mineral Processing	W 8611	2V	3	K	1	grad.	MP
Tutorial for Mineral Processing	W 8611	1Ü	1				
<b>Module 10: Responsible Mining</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
Responsible Mine Planning	S 6993	2V	3	K	0,45	grad.	MTP
Tutorial for Responsible Mine Planning	S 6994	1Ü	1	PA	0,2	grad.	MTP
Underground Mine Safety	S 6992	1V	2	K	0,35	grad.	MTP
<b>Module 11: Advanced Surface Mining</b>		<b>6</b>	<b>8</b>		<b>8/120</b>		
Introduction to Surface Mine Planning	W 6083	1V/1Ü	3	PA	0,75	grad.	MTP
Advanced Surface Mining	W 6069	1V/1Ü	3				
Surface Drilling Technology	S 6078	1V/1Ü	2	K	0,25	grad.	MTP
<b>Module 12: Applied Rock Mechanics</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
Applied Rock Mechanics	W 6237	2V	3	K	1	grad.	MP
Tutorial for Applied Rock Mechanics	W 6238	2Ü	3				
<b>Module 13: Mining Engineering Seminar</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
Mining Engineering Seminar	S 6074	3S	5	SL	1	grad.	MP
Literature research, writing and presenting	S 6995	1Ü	1				
<b>Module 14: Research Project</b>		<b>4</b>	<b>6</b>		<b>6/120</b>		
Research Project	W 6075	4S	6	PA	1	grad.	MP
<b>Module 15: Master Thesis</b>			<b>24</b>		<b>24/120</b>		
Master Thesis incl. Colloquium	-	4 Monate	24	Ab	1	grad.	MP

### Elective module selection “Compulsory Optional Subjects”

- Modules amounting to exactly 12 credit points must be chosen from the "Compulsory Optional Subjects" elective module catalogue and successfully completed. Further examinations can only be taken as additional examinations.
- The module selection is binding with the first test attempt in one of the optional compulsory modules. A change of optional compulsory module is only possible if no attempts have been made or are deemed to have been made in an optional compulsory module.

## Compulsory elective module catalogue:

### Elective module catalogue “Compulsory Optional Subjects”

The list of modules offered are subject to an annual update (from WS 2022/2023) for the following academic year by decision of the Faculty Council. The updated lists are disclosed to the university public by the study centre:

<https://www.tu-clausthal.de/studieninteressierte/studiengaenge/master-studiengaenge/mining-engineering>

Description of the module or course	Course-No.	Type of course, SWS	CP	Form of examination	Weighting	Grad ed?	Type of exam ination
<b>Module: Specialized Driving Methods</b>		2	3		3/120		
Specialized Driving Methods	S 6196	2V	3	K	1	grad.	MP
<b>Module: Rocksupport in Underground Mining and Tunneling</b>		2	3		3/120		
Rocksupport in underground Mining and Tunneling	S 6006	2V	3	K	1	grad.	MP
<b>Module: Underground Blasting and Explosives Engineering</b>		2	3		3/120		
Underground Blasting and Explosives Engineering	S 6230	2V	3	K or M	1	grad.	MP
<b>Module: Natural Gas Storage in Rock Caverns</b>		2	3		3/120		
Natural Gas Storage in Rock Caverns	S 6228	2V	3	K	1	grad.	MP
<b>Module: Computer-based Block Modeling and Reserve Estimation</b>		2	3		3/120		
Computer-based Block Modeling and Reserve Estimation	S 6066	1V/1Ü	3	PA	1	grad.	MP
<b>Module: Computer-based Surface Mine Planning</b>		2	3		3/120		
Computer-based Surface Mine Planning	S 6067	1V/1Ü	3	PA	1	grad.	MP
<b>Module: Underground Water Systems and Treatment</b>		2	3		3/120		
Underground Water Systems and Treatment	W 6998	2V	3	K	1	grad.	MP
<b>Module: Sustainable Mine Practice</b>		2	3		3/120		
Sustainable Mine Practice	W 6987	2V	3	K or M	1	grad.	MP
<b>Module: Mine Closure</b>		2	3		3/120		
Mine Closure	S 6988	2V	3	M	1	grad.	MP
<b>Module: Specialized Driving Methods</b>		2	3		3/120		
Specialized Driving Methods	S 6196	2V	3	K	1	grad.	MP



## Explanations:

(1) Type of course:

F	Field trip
P	Practical training
S	Seminar
T	Tutorium
V	Lecture
Ü	Exercise

(2) Form of examination:

K	Written examination
M	Oral examination
SP	Seminar performance
PrW	Practical work
ThW	Theoretical work
SRP	Student research project
PW	Project work
IP	Industrial internship
HA	Paper
Ex	Excursions
Fth	Final theses

(3) Type of performance:

LN	Proof of performance
MP	Module exam
MTP	Module partial examination
PV	Preliminary examination performance

(4) Other abbreviations

grad.	graded performance
ungrad.	ungraded performance
or	or
LV	Course
Prüf.	Test
CP	Credit points
SWS	Weekly hours per semester

**Annex 2: Model study plan of the Master's programme in Mining Engineering (start in winter semester)**

SWS	Semester 1	Semester 2	Semester 3	Semester 4
1	Underground Mining Equipment 6 CP	Responsible Mining 6 CP	Student Research Project 6 CP	Master's Thesis 24 CP
2				
3				
4				
5	Shaft Sinking and Advanced Ventilation 6 CP		IoT und Digitalization for Circular Economy 6 CP	
6				
7	Mineral Ressources 6 CP			
8				
9	Mining and Environment 6 CP	Advanced Surface Mining 8 CP		
10				
11				
12		Advanced Rock Mechanics 6 CP		
13	International Mining 6 CP			
14		Applied Rock Mechanics 6 CP		
15				
16		Seminar 6 CP		
17			Electives 12 CP	
18	Geomatics 6 CP			
19				
20				
21	Mineral Processing 4 CP			
22				
ECTS:	32	28	30	30

	Prof. O. Langefeld
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