

 **Administration Manual**

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

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| Compulsory modulesThe module listed below must be completed with 108 credit points. |
| *Description of the module or course* | *Course-No.* | *Type of course,SWS* | *CP* | *Form of exam-ination* | *Weighting* | *Graded?* | *Type of exam-ination* |
| Module 1: Shaft Sinking and Advanced Ventilation  |  | 4 | 6 |  | 6/120 |  |  |
| 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 |
| Module 2: International Mining |  | 4 | 6 |  | 6/120 |  |  |
| 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 |
| Module 3: Geomatics |  | 5 | 6 |  | 6/120 |  |  |
| 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 |
| Module 4: Mineral Resources |  | 4 | 6 |  | 6/120 |  |  |
| 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 |
| Module 5: IoT and Digitalization for Circular Economy |  | 4 | 6 |  | 6/120 |  |  |
| IoT and Digitalization for Circular Economy | W 1637 | 3V/1Ü | 6 | K or M  | 1 | grad. | MP |
| Module 6: Underground Mining Equipment |  | 4 | 6 |  | 6/120 |  |  |
| 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 |
| Module 7: Advanced Rock Mechanics |  | 4 | 6 |  | 6/120 |  |  |
| Advanced Rock Mechanics | S 6260 | 2V | 3 | K | 1 | grad. | MP |
| Tutorial for Advanced Rock Mechanics | S 6251 | 2Ü | 3 |
| Module 8: Mining and Environment |  | 4 | 6 |  | 6/120 |  |  |
| Mining and Environment | W 6068  | 2V | 4 | K or M | 1 | grad. | MP |
| Tutorial Mining and Environment | W 6078 | 2Ü | 2 |

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| Module 9: Mineral Processing |  | 3 | 4 |  | 4/120 |  |  |
| Mineral Processing | W 8611 | 2V | 3 | K | 1 | grad. | MP |
| Tutorial for Mineral Processing | W 8611 | 1Ü | 1 |
| Module 10: Responsible Mining |  | 4 | 6 |  | 6/120 |  |  |
| 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 |
| Module 11: Advanced Surface Mining  |  | 6 | 8 |  | 8/120 |  |  |
| 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 |
| Module 12: Applied Rock Mechanics |  | 4 | 6 |  | 6/120 |  |  |
| Applied Rock Mechanics | W 6237 | 2V | 3 | K | 1 | grad. | MP |
| Tutorial for Applied Rock Mechanics | W 6238 | 2Ü | 3 |
| Module 13: Mining Engineering Seminar |  | 4 | 6 |  | 6/120 |  |  |
| Mining Engineering Seminar | S 6074 | 3S | 5 | SL | 1 | grad. | MP |
| Literature research, writing and presenting | S 6995 | 1Ü | 1 |
| Module 14: Research Project  |  | 4 | 6 |  | 6/120 |  |  |
| Research Project  | W 6075 | 4S | 6 | PA | 1 | grad. | MP |
| Module 15: Master Thesis |  |  | 24 |  | 24/120 |  |  |
| Master Thesis incl. Colloquium | - | 4 Monate | 24 | Ab | 1 | grad. | MP |
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| 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.
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Compulsory elective module catalogue:

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| 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* | *Graded?* | *Type of examination* |
| Module:Specialized Driving Methods |  | 2 | 3 |  | 3/120 |  |  |
| Specialized Driving Methods  | S 6196 | 2V | 3 | K | 1 | grad. | MP |
| Module:Rocksupport in Underground Mining and Tunneling |  | 2 | 3 |  | 3/120 |  |  |
| Rocksupport in underground Mining and Tunneling | S 6006 | 2V | 3 | K | 1 | grad. | MP |
| Module: Underground Blasting and Explosives Engineering |  | 2 | 3 |  | 3/120 |  |  |
| Underground Blasting and Explosives Engineering | S 6230 | 2V | 3 | K or M | 1 | grad. | MP |
| Module: Natural Gas Storage in Rock Caverns |  | 2 | 3 |  | 3/120 |  |  |
| Natural Gas Storage in Rock Caverns | S 6228 | 2V | 3 | K | 1 | grad. | MP |
| Module: Computer-based Block Modeling and Reserve Estimation |  | 2 | 3 |  | 3/120 |  |  |
| Computer-based Block Modeling and Reserve Estimation | S 6066 | 1V/1Ü | 3 | PA | 1 | grad. | MP |
| Module: Computer-based Surface Mine Planning  |  | 2 | 3 |  | 3/120 |  |  |
| Computer-based Surface Mine Planning  | S 6067 | 1V/1Ü | 3 | PA | 1 | grad. | MP |
| Module:Underground Water Systems and Treatment |  | 2 | 3 |  | 3/120 |  |  |
| Underground Water Systems and Treatment | W 6998 | 2V | 3 | K | 1 | grad. | MP |
| Module:Sustainable Mine Practice |  | 2 | 3 |  | 3/120 |  |  |
| Sustainable Mine Practice | W 6987 | 2V | 3 | K or M | 1 | grad. | MP |
| Module:Mine Closure |  | 2 | 3 |  | 3/120 |  |  |
| Mine Closure | S 6988 | 2V | 3 | M | 1 | grad. | MP |
| Module:Specialized Driving Methods |  | 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)

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| SWS | Semester 1 | Semester 2  | Semester 3 | Semester 4 |
| 1 | Underground Mining Equipment6 CP | Responsible Mining6 CP | Student Research Project6 CP | Master's Thesis24 CP |
| 2 |
| 3 |
| 4 |
| 5 | Shaft Sinking and Advanced Ventilation6 CP | IoT und Digitalization for Circular Economy6 CP |
| 6 |
| 7 | Mineral Ressources6 CP |
| 8 |
| 9 | Mining and Environment6 CP | Advanced Surface Mining8 CP |
| 10 |
| 11 | Advanced Rock Mechanics6 CP |   |
| 12 |   |
| 13 | International Mining 6 CP | Applied Rock Mechanics6 CP |
| 14 |
| 15 | Seminar6 CP |
| 16 |
| 17 |   | Electives12 CP |
| 18 | Geomatics 6 CP |
| 19 |
| 20 | Mineral Processing4 CP |   |
| 21 |   |   |   |
| 22 |  |  |   |
| ECTS: | 32 | 28 | 30 | 30 |
|  |  |  |  |  |
|  | Prof. O. Langefeld |  | Prof. A. Weber |
|  | Prof. H. Tudeshki |  | Prof. A. Rausch |
|  | Prof. J.-A. Paffenholz |  | Prof. B. Lehmann |
|  | Prof. U. Düsterloh |  |  |

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