

OFFICIAL ANNOUNCEMENT

Course-specific examination regulations for

the Master's programme

Metallurgical Engineering

at the Rheinisch-Westfälische Technische Hochschule Aachen

from 17.06.2016

in the version of the fourth order amending the examination regulations

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On the basis of §§ 2 Paragraph 4, 64 of the Act on the Universities of North Rhine-Westphalia (Higher Education Act - Hochschulgesetz - HG) in the version promulgated on 16 September 2014 (GV. NRW p. 547), last amended by Article 3 of the Act of 17 October 2017 Securing the Accreditation of Study Programmes in North Rhine-Westphalia (GV. NRW p. 806), the Rheinisch-Westfälische Technische Hochschule Aachen (RWTH) has issued the following examination regulations:

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I. General information

§ 1

Scope and academic degree

- (1) These examination regulations apply to the Master's programme in Metallurgical Engineering at the RWTH. It only applies in conjunction with the overarching examination regulations (ÜPO) in the relevant version and contains supplementary regulations specific to the course of study. In cases of doubt, the provisions of the overarching examination regulations shall apply with priority.
- (2) Upon successful completion of the Master's program, the Faculty of Georesources and Materials Engineering awards the academic degree of Master of Science RWTH Aachen University (M. Sc. RWTH).

§ 2

Nature and purpose of the programme and language arrangements

- (1) The overarching study objectives are regulated in § 2 paras. 1, 3 and 4 ÜPO.
- (2) The studies are conducted in English.

§ 3

Entry requirements

- (1) The prerequisite for admission is a recognised first university degree in accordance with § 3 Para. 4 ÜPO.
- (2) It is necessary for the applicant to prove that he or she has the necessary prior knowledge in the following areas which are required for a successful course of study in the Master's programme in Metallurgical Engineering:

Basic component:

- a) At least 30 CP from the fields of mathematics, physics, inorganic chemistry and physical chemistry
 - b) At least 10 CP from the field of mechanics, machine components, electrical engineering, crystallography
- a) and b) must total at least 60 CP.

Engineering-specific component:

- A total of 4 CP from the field of basic engineering sciences

- (3) Admission in connection with a condition shall be subject to § 3 (6) ÜPO. If conditions require more than 10 CP, admission to the Master's programme is not possible.
- (4) This Master's programme requires proof of adequate command of the English language in accordance with § 3 Para. 10 ÜPO on the part of applicants who have not acquired their study qualification at an exclusively English-speaking institution or who are not native speakers.
- (5) § 3 (12) of the ÜPO shall apply to the determination of the prerequisites for admission.

- (6) § 13 ÜPO contains general regulations on the recognition of examination performances.

§ 4
Standard period of study, structure of the degree programme, credit points and scope of studies

- (1) The standard period of study, including the preparation of the Master's thesis, is four semesters (two years) full-time. The programme can only be started in the winter semester.
- (2) The programme consists of elective modules depending on the specialisation, a supplementary subject, a student research project and a practical work of ten weeks (50 working days) in accordance with the guidelines for practical work in the profession (Annex 2). One of the following modules must be completed: The study courses Process Technology of Metals, Physical Metallurgy and Materials, Materials Science of Steels, Corrosion Engineering and Structural Integrity. For successful completion of studies, a total of 120 CP must be acquired. The Master's examination is composed as follows:

Elective modules, depending on field of study, thereof Core components 48 CP Specialised components 21 CP	69 CP
Student research project	8 CP
Internship or experimental thesis	10 CP
German Course (Subsidiary component)	3 CP
Master's thesis	30 CP
Total	120 CP

- (3) Depending on the field of study, the course includes 14 to 15 modules, including the Master's thesis module. All modules are defined in the module catalogue. The weighting of the examination performances to be performed in the individual modules with CP is carried out in accordance with § 4 Para. 4 ÜPO.

§ 5
Compulsory attendance of courses

- (1) In accordance with § 5 Para. 2 ÜPO, attendance is compulsory for teaching events of the following type:
1. Tutorials
 2. Seminars and proseminars
 3. Colloquia
 4. (Laboratory) Practicals
 5. Field trips
- (2) The events for which attendance is required according to paragraph 1 are identified as such in the module log.

§ 6

Examinations and examination periods

- (1) General regulations on examinations and examination periods are contained in § 6 ÜPO.
- (2) If the successful participation in modules or examinations or the passing of modules according to § 5 Abs. 4 ÜPO is a prerequisite for the participation in further examinations, this is indicated in the module catalogue accordingly.

§ 7

Forms of examinations

- (1) § 7 ÜPO contains general regulations on the forms of examination.
- (2) The following further form of examination in accordance with § 7 para. 1 ÜPO is provided for:

A **presentation** is a lecture of a minimum duration of 10 minutes and a maximum duration of 30 minutes. The students should prove that they are able to work out a topic scientifically, taking into account the context of the subject, and that they can present the results orally.
- (3) The duration of a written examination for the award of the contract is as follows
 - up to 3 CP: not less than 15 and not more than 90 minutes
 - up to 6 CP: not less than 30 and not more than 120 minutes
 - more than 6 CP: not less than 60 and not more than 180 minutes.
- (4) The duration of an oral examination is between 15 and 30 minutes. An oral examination as a group examination is held with no more than four candidates.
- (5) The following applies in detail to seminar papers and student research projects: Student research projects consist of a written paper; they are concluded with a colloquium and graded. The time period for the student research project is a minimum of 5 weeks and a maximum of 6 months. As an exception, the responsible examination board can extend the deadline for the student research project by up to 6 weeks in individual cases, upon justified request of the candidate and if approved by the tutor.
- (6) The following applies in detail to colloquia: The colloquium may begin with a presentation in accordance with paragraph 2. The examination lasts at least 15 minutes and not more than 45 minutes.
- (7) The examiner determines the duration of the respective examination at the beginning of the corresponding course.
- (8) Admission to module examinations may be linked to the passing of so-called module components as preliminary examination work within the meaning of § 7 Para. 15 ÜPO. This is shown for the corresponding modules in the module catalogue. The exact criteria for a possible grade improvement by completing module components, in particular the number and type of bonus exercises to be completed in the semester as well as the correction and evaluation mode, are announced by the lecturer in the CMS at the beginning of the semester, at the latest, however, by the start of timetabled courses.

§ 8

Assessment of examination performance and awarding of grades

- (1) General regulations for the assessment of examination performance and awarding of grades are contained in § 10 ÜPO.
- (2) If an examination consists of several partial achievements, each partial achievement must have been assessed or passed with the grade of at least "sufficient" (4.0).
- (3) A module is passed if all associated examinations have been passed with a grade of at least sufficient (4.0) and all other CP or module components associated with the respective course of study have been completed.
- (4) The overall grade is formed from the grades of the modules and the grade of the Master's thesis in accordance with § 10 Para. 10 ÜPO. The grades of the individual modules are weighted with the following factors, depending on the range of modules:

Module area	Weighting factor
Module area 1 (core modules)	0,45
Module area 2 (modules from the area of specialisation)	0,20
Module area 3 (all other modules including the master thesis)	0,35

§ 9

Examination board

The responsible examination board according to § 11 ÜPO is the Master Examination Board Metallurgical Engineering of the Faculty of Georesources and Materials Engineering.

§ 10

Examination or Master's thesis re-takes and expiration of entitlement to examination

- (1) General regulations on re-taking examinations or the Master's thesis and the expiration of entitlement to examination are contained in § 14 ÜPO.
- (2) Freely elected modules within the subject-specific specialisation of this Master's programme can be replaced upon application to the examination board as long as the relevant module catalogue permits this. It is not possible to change compulsory modules.
- (3) An area (field of study) of this Master's programme can be changed on application to the responsible examination board.

§ 11

Deregistration, failure, withdrawal, cheating, violation of order

General provisions on deregistration, Deregistration, failure, withdrawal, cheating, violation of order are contained in § 15 ÜPO.

II. Master's examination and Master's thesis

§ 12

Type and scope of the Master's examination

- (1) The Master's examination consists of
 1. the examinations to be taken according to the structure of the course of study in accordance with § 4 Para. 2 and listed in the module catalogue,

as well as
 2. the master's thesis and the master's lecture colloquium.
- (2) The sequence of courses is based on the study plan (Annex 1). The assignment of the Master's thesis can only be issued if at least 77 CP from all written and oral examinations are proven. Only the non-technical elective subject (Complementary Course) and the practical professional activity can be proven after the assignment of the Master's thesis has been issued.

§ 13

Master's thesis

- (1) General regulations for Master's theses are contained in § 17 ÜPO.
- (2) With regard to the supervision of the Master's thesis, reference is made to § 17 Para. 2 ÜPO.
- (3) The Master's thesis will be written in English.
- (4) The allocated time period for working on the Master's thesis is usually a maximum of six months during the course of study. In justified exceptional cases, the deadline may be extended by a maximum of up to six weeks upon application to the examination board in accordance with § 17 (7) ÜPO. The size of the written work should not exceed 80 pages without Annexes.
- (5) The results of the Master's thesis are presented by the candidate at a Master's lecture colloquium. Section 7 (12) ÜPO in conjunction with Section 7 (6) shall apply accordingly.
- (6) The scope of work for the Master's thesis and the colloquium is 30 CP. The master thesis can only be graded after the master lecture colloquium has been held.

§ 14

Acceptance and evaluation of the Master's thesis

- (1) General regulations for the acceptance and evaluation of the Master's thesis are contained in § 18 ÜPO.
- (2) A single copy of the Master's thesis must be submitted in due time to the examination board. A printed and bound copy should be submitted.

III. Final provisions

§ 15 Inspection of the examination files

Inspection shall take place in accordance with § 22 ÜPO.

§ 16 Entry into force, publication and transitional provisions

- (1) These examination regulations come into force in the winter semester 2019/2020 and are published in the official announcements of the RWTH.
- (2) The examination regulations for the Master's programme in Metallurgical Engineering dated 27.09.2010, in the version of the first regulations amending the examination regulations dated 29.11.2013, will be incorporated into these examination regulations.
- (3) These examination regulations apply to all students enrolled in the master's course in Metallurgical Engineering at the RWTH.
- (4) All students who began their studies in this Master's programme before the 2016/2017 winter semester may, provided all module examinations have been passed within the standard period of study, submit an application to the responsible examination board for the removal of the worst of the weighted module grades from the three module areas.
- (5) Module components that were passed before the winter semester 2015/2016 are valid for all examination attempts available for a given course.

Based on the resolutions of the Faculty Council of the Faculty of Georesources and Materials Engineering of 15.07.2015, 06.07.2016, 21.06.2017, 11.07.2018 and 26.06.2019.

The Rector
of the Rhenish-Westphalian
Technical University Aachen

Aachen, the _____

signed Ruediger

Professor Dr. rer. nat. Dr. h. c. mult. U.
Rüdiger

Appendix 1: Study plans

Study plan specializing in "Process Technology of Metals"

	SWS	LP
1. Semester (WS)		
Materials Chemistry II	V4 Ü2	8
Physical Metallurgy	V4 Ü2	8
Process Metallurgy and Recycling of Non-Ferrous Metals	V2 Ü1	4
Process Metallurgy and Recycling of Iron and Steel	V2 Ü1	4
Process control engineering	V2 Ü1	4
Transport Phenomena	V2 Ü1	4
		32
2. Semester (SuSe)		
Fabrication Technology of Metals	V4 Ü2	8
Transport Phenomena	V2 Ü1	4
Melt Treatment and Continuous Casting	V2 Ü1 P1	4
Unit Operations in Nonferrous Metallurgy	V2 Ü1 P2	5
Student Research Project (student research project)		8
		29
3. Semester (WS)		
Casting Processes and Casting Alloys	V2 Ü1 P1	4
Fundamentals and Solving Methods in Metal Forming	V2 Ü2 P3	8
Process control engineering	V2 Ü1	4
Complementary course		3
Internship (practical professional activity) or Experimental Student Research Project (exp. Student research)		10
		29
4. Semester (SuSe)		
Master Thesis (Master Thesis)		27
Colloquium (Master lecture)		3
		30
Total		120

Study plan specializing in "Physical Metallurgy and Materials"

	SWS	LP
1. Semester (WS)		
Materials Chemistry II	V4 Ü2	8
Physical Metallurgy	V4 Ü2	8
Process Metallurgy and Recycling of Non-Ferrous Metals	V2 Ü1	4
Process Metallurgy and Recycling of Iron and Steel	V2 Ü1	4
Mineral Materials	V4 Ü2	8
		32
2. Semester (SuSe)		
Fabrication Technology of Metals	V4 Ü2	8
Metallic Materials	V4 Ü2	8
Advanced Physical Metallurgy II	V2 Ü1	4
Micromechanics of Materials	V3 Ü1	4
Complementary course		3
		27
3. Semester (WS)		
Introduction to Texture Analysis	V2 Ü2	4
Advanced Physical Metallurgy I	V2 Ü1	3
Physical Metallurgy Lab	Ü1 P5	6
Student Research Project (student research project)		8
Internship (practical professional activity) or Experimental Student Research Project (exp. Student research project)		10
		31
4. Semester (SuSe)		
Master Thesis (Master Thesis)		27
Colloquium (Master lecture)		3
		30
Total		120

Study plan specializing in "Materials Science of Steels"

	SWS	LP
1. Semester (WS)		
Materials Chemistry II	V4 Ü2	8
Physical Metallurgy	V4 Ü2	8
Process Metallurgy and Recycling of Non-Ferrous Metals	V2 Ü1	4
Process Metallurgy and Recycling of Iron and Steel	V2 Ü1	4
Mineral Materials	V4 Ü2	8
		32
2. Semester (SuSe)		
Fabrication Technology of Metals	V4 Ü2	8
Metallic Materials	V4 Ü2	8
Software Tools for Integrated Computational Materials Design	V2 P2	4
Material Characterization	Ü1 P2	3
Student Research Project (student research project)		8
		31
3. Semester (WS)		
Materials Science of Steel	V2 Ü1 P3	5
Steel design	V2	3
Physical Metallurgy Lab	Ü1 P5	6
Complementary course		3
Internship (practical professional activity) or Experimental Student Research Project (exp. Student research)		10
		27
4. Semester (SuSe)		
Master Thesis (Master Thesis)		27
Colloquium (Master lecture)		3
		30
Total		120

Study plan specializing in "Corrosion Engineering"

	SWS	LP
1. Semester (WS)		
Materials Chemistry II	V4 Ü2	8
Physical Metallurgy	V4 Ü2	8
Process Metallurgy and Recycling of Non-Ferrous Metals	V2 Ü1	4
Process Metallurgy and Recycling of Iron and Steel	V2 Ü1	4
Fundamentals of Corrosion	V2 Ü2 P2	8
		32
2. Semester (SuSe)		
Fabrication Technology of Metals	V4 Ü2	8
Metallic Materials	V4 Ü2	8
Principles of Corrosion Protection	V2 Ü2 K1	5
Advanced Corrosion engineering	V2 Ü2 K1	5
Complementary Course		3
		29
3. Semester (WS)		
Corrosion Control in Key Industries	V2 Ü1	3
Advanced Corrosion Lab	P6	8
Student Research Project (student research project)		8
Internship (practical work) or Experimental Student Research Project (exp. Student research project)		10
		29
4. Semester (SuSe)		
Master Thesis (Master Thesis)		27
Colloquium (Master lecture)		3
		30
Total		120

Study plan specializing in "Structural Integrity"

	SWS	LP
1. Semester (WS)		
Materials Chemistry II	V4 Ü2	8
Physical Metallurgy	V4 Ü2	8
Process Metallurgy and Recycling of Non-Ferrous Metals	V2 Ü1	4
Process Metallurgy and Recycling of Iron and Steel	V2 Ü1	4
Fundamentals of Fracture Mechanics	V2 Ü4 P1	9
		33
2. Semester (SS)		
Fabrication Technology of Metals	V4 Ü2	8
Fundamentals of Damage Mechanics and Material Modelling	V4 Ü2 P1	9
Metallic Materials	V4 Ü2	8
Complementary course		3
		28
3. Semester (WS)		
Fundamentals and Solving Methods in Metal Forming	V2 Ü1 P1	8
Corrosion Control in Key Industries	V2 Ü1	3
Student Research Project (student research project)		8
Internship (practical work) or Experimental Student Research Project (exp. Student research project)		10
		29
4. Semester (SS)		
Master Thesis (Master Thesis)		27
Colloquium (Master lecture)		3
		30
Total		120

Appendix 2: Guidelines for professional activity

The practical work usually consists of an industrial internship. In the event that there is no internship available, students have the opportunity to complete the internship in a large research institution (Fraunhofer, Helmholtz, Max Planck Society, etc.) or to complete a second, experimental student research project instead. The alternatives require the approval of the Examination Board.

Targets:

The practical work should give the students insight into the chosen occupational field, first orientation aids for goals of later occupational activity and an impression of the social conditions of an industrial enterprise. Getting to know industrial processes should help to better understand and deepen the teaching material offered during the course of studies.

Duration:

For this purpose, a duration of 10 weeks is required for the internship.

Execution:

The lecture-free period is available for the practice of the profession. The focus of the practical professional activity to be carried out should lie in the close relationship to the chosen field of study. In consultation with the examination board, the student must appoint an internship supervisor. The internship supervisors are all university professors of the Master's program in Metallurgical Engineering. The choice of the respective department is made by the student in consultation with the company and, if necessary, the examination board for the Master's degree course in Metallurgical Engineering. In particular, the aim is to acquire knowledge about the production and processing of the materials as well as insights into the operating procedure. Practical work with a focus on research and development is not possible.

The students should complete their internship in Europe or worldwide in a German company. The respective professional associations, whose addresses can be obtained from the secretariat of the professional group or the respective institutes, are helpful in the placement of internships.

Recognition of the internship:

Presentation:

The interns report on their internship in the form of a presentation at the supervisor's institute. The form and duration of the presentation will be agreed with the supervisor. After the presentation and a subsequent discussion, the supervisor will issue a certificate, which will be presented to the examination board together with the internship certificates for recognition of the practical activity.

Internship certificate:

Upon completion of the practical work, the student must have the activity confirmed by the company. In addition to the exact name of the work and the department, information about the time, duration and type of employment must be provided. Keeping an activity report book is not required.

Recognition:

The recognition of the internship activity and the award of the overall certificate is carried out by the examination board of the Master's programme in Metallurgical Engineering. The recognition of the internship includes the presentation and the internship certificate.