OFFICIAL ANNOUNCEMENT

RWTH AACHEN UNIVERSITY

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Course-Specific Examination Regulations

for the Master's Course of Study in

Materials Engineering

at RWTH Aachen University

Originally Published February 3, 2022,

Now Issued in Their First Revised Version

Dated July 7, 2023,

Published as a Complete Version

Please note: This publication is an English translation. Only the German original of these regulations as published in the Official Announcements of RWTH Aachen University ("Amtliche Bekanntmachungen") is legally binding.

Based on §§ 2 (4) and 64 of the Higher Education Act of the State of North Rhine-Westphalia (Hochschulgesetz – HG) in the version of the announcement dated September 16, 2014 (Law and Official Gazette of the State of North Rhine-Westphalia p. 547), most recently amended by Article 1 of the Act on Membership of University Hospitals in the Employers' Association of North Rhine-Westphalia, dated June 30, 2022 (GV. NRW p.780b), RWTH Aachen University (RWTH) has issued the following regulations:

ISSUED BY DIVISION 1.1 OF DEPARTMENT 1.0 ON BEHALF OF THE RECTOR OF RWTH AACHEN UNIVERSITY
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I. General

§ 1
Scope of Application and Academic Degree

(1) These regulations apply to the master's course of study in Materials Engineering at RWTH. They only apply in conjunction with the currently valid version of the General Examination Regulations (GER), supplementing it with additional course-specific regulations. In cases of doubt, the provisions of the General Examination Regulations take precedence.

(2) Students who successfully complete the master's course of study are awarded the academic degree of Master of Science RWTH Aachen University (M. Sc. RWTH) by the Faculty of Georesources and Materials Engineering.

§ 2
Objectives of the Course of Study and Language Provisions

(1) This is a master's degree program in accordance with § 2 (3) GER.

(2) The general educational objectives and outcomes are set out in § 2 (1, 3, and 4) GER. For further information and provisions on the objectives of this master's course, please refer to the description of the examination regulations, to be found at the beginning of the module handbook.

(3) The course of study is taught in English. Insofar as individual modules are taught in another language, this is to be indicated in the module handbook.

§ 3
Admission Requirements

(1) An essential requirement for admission is a recognized first university degree according to § 3 (4) GER.

(2) To meet the educational prerequisites and successfully complete the master's course of study in Materials Engineering, the applicant must have the necessary knowledge evidenced by credit points in the following areas:

A total of 60 CP from the areas of mathematics and natural sciences and engineering. These must include:

a) at least 30 CP from the fields of mathematics, physics, inorganic chemistry, physical chemistry

and

b) at least 10 CP from the field of mechanics, machine components, electrical engineering, and crystallography.

(3) For admission conditional on the completion of additional requirements, § 3 (6) GER applies. If additional requirements corresponding to more than 10 credit points are imposed, admission to the master's course of study will be denied.

(4) For this master's course of study, adequate knowledge of the English language must be demonstrated by applicants who have not acquired their university entrance qualification at an English-language institution or who have a native language other than English.

(5) If admission is dependent on the completion of additional requirements and one or more of these requirements can only be completed in German, then, in addition to the language skills as outlined in paragraph 4, the candidate must also provide evidence of sufficient proficiency in German pursuant to § 3 (7a) GER.

(6) § 3 (12) GER applies when determining whether the admission requirements are met.

(7) General regulations for the recognition of prior exams and assessments are stipulated in § 13 GER.

§ 4
Standard Period of Study, Curriculum, Credit Points, and Degree Components

(1) The standard period of study is four semesters (two years) full-time, including preparation of the master's thesis. The course of study may be commenced in either semester.

(2) The program consists of an overarching compulsory section (basic section), a mandatory elective section depending on the specialization (supplementary section), and the master's thesis. Students must complete one of the following specializations: Materials Physics and Design, Energy Materials, Materials Science of Steel, Corrosion Engineering, Structural Integrity, Sustainable Process Metallurgy and Metal Recycling, and Sustainable Metal Forming and Casting. For successful completion of the degree program, a total of 120 credit points must be acquired. The master's program of study is comprised of the following components:

Overarching compulsory section (foundational component)	32 CP
Mandatory elective section depending on the specialization (supplementary component)	58 CP
Master's thesis	30 CP
Total	120 CP

(3) The degree program, including the master's thesis module, is comprised of 16-19 modules. All modules are specified in the module handbook. The CP of the assessments that are to be taken in the individual modules are weighted according to § 4 (4) GER.

§ 5
Obligatory Attendance in Classes

(1) According to § 5 (2) GER, obligatory attendance can only be stipulated in the following course types:

1. Tutorials
2. Seminars and undergraduate seminars
3. Colloquia
4. Lab courses
5. Excursions

(2) Classes for which attendance is required in accordance with paragraph 1 shall be identified as such in the module catalog.

§ 6
Policies Governing Exams and Assignments

(1) General regulations governing exams and assignments are defined in § 6 GER.

(2) If successful completion of modules, exams, or module components according to § 5 (4) GER is stipulated as a precondition for participation in other exams and assignments, this is indicated in the module handbook.

§ 7
Types of Exams and Assignments

(1) General regulations governing types of exams and assignments are defined in § 7 GER.

(2) The following additional forms of exams or assignments are a required degree component in line with § 7 (1) GER:

Students are required to give a **presentation** lasting at least 10 and not more than 30 minutes. The presentation should demonstrate that the student is able to prepare a topic in a scientific manner, have command of the subject and its objects of investigation, and is able to orally present their findings.

(3) Written exams shall be scheduled to last:

- at least 15 and not more than 90 minutes for up to 3 CP
- at least 30 and not more than 120 minutes for up to 6 CP
- at least 60 and not more than 180 minutes for more than 6 CP

(4) Oral exams shall be scheduled to last 15 to 30 minutes. An oral exam may be carried out as a group exam with up to four candidates.

(5) The following applies to seminar papers and research papers: Students must write a research paper and hold a subsequent colloquium on it before it is graded. The write-up period for a research paper shall be at least 5 weeks and not more than 6 months. In exceptional cases, the responsible examination board may extend the write-up period for student research papers by up to 6 weeks if they receive a justified request from the candidate and it is approved by the instructor who gave them the assignment.

(6) The following applies to colloquia: The colloquium may begin with a presentation according to paragraph 2. The assessment shall last at least 15 minutes and not more than 45 minutes.

(7) Instructors shall specify how much time students are allowed for a given assignment or exam and, if applicable, explain other assessment modalities at the start of their course.

(8) Admission to module exams or assignments may be conditional on the successful completion of module components in accordance with § 7 (15) GER. For the relevant modules, this is outlined in the module handbook. At the start of the semester, or by the first session of the course, the instructor shall provide their students with precise criteria online regarding opportunities to improve their grades by completing module components, specifically indicating the number and type of tutorials that can be taken for extra credit and the methods of correction and assessment.

§ 8
Assessment and Grading

(1) General regulations for assessing exams and the formation of grades are stipulated in § 10 GER.

(2) If an exam or assignment consists of several components, each component must be passed, i.e. be completed at least with the grade “sufficient” (4.0).

(3) A module is successfully completed once the student passes all the associated exams or assignments with a grade of at least “sufficient” (4.0), has earned all other credit points, and has completed all module components according to the relevant course of study-specific examination regulations.

(4) The overall grade is formed from the module grades and the grade of the master’s thesis in accordance with § 10 (10) GER.

§ 9
Examination Board

The responsible examination board under the terms of § 11 GER, is the Master’s Examination Board of the Faculty of Georesources and Materials Engineering.

§ 10
Repeat Attempts at Exams, Assignments, or the Master’s Thesis, and Losing the Right to Take Assessments

(1) General regulations governing retaking exams, redoing assignments or submitting a second master’s thesis, and losing the right to take exams or complete assignments are stipulated in § 14 GER.

(2) Modules that can be freely selected within a core elective section of this master’s course of study can be substituted by another, provided that the module handbook permits this. It is not possible to substitute mandatory modules.

(3) Students may transfer to another specialization upon application to the responsible examination board.

§ 11
Withdrawal from Exams or Assignments, Unjustified Absence or Unfinished Work, and Academic and Other Forms of Misconduct

(1) General provisions on deregistering or withdrawing from exams or assignments, unjustified absence, failing to submit required work, violating academic integrity, or committing other infractions against the rules are stipulated in § 15 GER.

II. Master’s Degree Requirements and Master’s Thesis

§ 12
Master's Degree Requirements

(1) Candidates receive a master's degree after completing:

1. all exams and assignments as per the degree components listed under § 4 (2) and described in more detail in the module handbook, and

2. original work reported in a master's thesis and master's final colloquium.

(2) The order in which students shall take the courses is based on the curriculum (Appendix 1). The master's thesis can only be registered when students have completed a total of 82 credit points and provided evidence of having completed the mandatory internship.

§ 13
Master's Thesis

(1) General provisions for the master's thesis are stipulated in § 17 GER.

(2) Further details regarding the supervision of the master's thesis are outlined in § 17 (2) GER.

(3) The master's thesis is to be written English.

(4) The write-up period for the master's thesis is usually at least four months and not more than six months alongside studies. In justified exceptional cases, the write-up time can be extended by a maximum of up to six weeks upon application to the examination board in accordance with § 17 (7) GER. The thesis should not exceed 80 pages (excluding appendices).

(5) The candidate shall present the results of their master's thesis in a master's final colloquium – § 7 (12) GER in connection with § 7 (6) apply accordingly. The master's final colloquium may be held before the master's thesis is submitted. Students must hold the master's final colloquium no later than six weeks after submitting their master's thesis.

(6) The work required for preparing and writing the master's thesis, including the colloquium, shall correspond to 30 credit points. The master's thesis can only be graded after the master's final colloquium has taken place.

§ 14
Acceptance and Assessment of the Master's Thesis

(1) General provisions on the acceptance and assessment of the master's thesis are stipulated in § 18 GER.

(2) One copy of the master's thesis is to be submitted to the Central Examination Office by the set deadline. This copy must be printed and bound. Furthermore, the thesis must be submitted as a PDF file on a data carrier.

III. Final Provisions

§ 15
Exam Viewing

The viewing of exams shall be carried out in accordance with § 22 GER.

§ 16
Entry into Effect, Publication, and Transitional Provisions

(1) These examination regulations are published in the official announcements of RWTH Aachen University (“Amtliche Bekanntmachungen”) and come into effect the day after publication.

(2) These examination regulations apply to all students who have enrolled in master’s course of study in Materials Engineering at RWTH.

Issued on the basis of the resolutions of the Faculty Council of the Faculty of Georesources and Materials Engineering from June 9, 2021, and June 21, 2023.

It is pointed out that, in accordance with § 12 (5) NRW HG, any claims regarding a violation of procedural or formal requirements of the regulatory or other autonomous rights of the University may no longer be asserted after one year has elapsed since the official publication of this announcement unless:

1) the announcement has not been properly published,
2) the Rectorate has objected, prior to publication, to the decision of the committee adopting the regulations,
3) the University has been previously notified about the defect of form or procedure in a complaint, specifying the infringed legal provision and the fact that gives rise to the defect, or
4) the legal consequence of the exclusion of complaints was not pointed out in the public announcement.

The Rector
of RWTH Aachen University

Aachen, July 7, 2023,

sgd. Rüdiger
Univ.-Prof. Dr. rer. nat. Dr. h. c. mult. Rüdiger

Appendix 1: Curriculum

Studienverlaufsplan "Materials Physics and Design"

	CP
1. Semester (WS)	
Materials Chemistry II	8
Materials Physics	8
Mineral Materials I	4
Metallic Materials I	4
Process Technology	8
	32
2.Semester (SS)	
Introduction to Metall Casting	4
Introduction to Metal Forming	4
Materials Physics and Design II	6
Sustainable Materials	4
Process Metallurgy and Recycling of Non-Ferrous Metals	4
Introduction to Data Mining and Machine Learning	3
Surface Engineering for Corrosion Protection	5
	30
3. Semester (WS)	
Materials Physics & Design I	8
Materials Physics Lab	7
Materials Data Science and Materials Informatics	3
Wahlpflichtbereich	10
	28
4.Semester (SS)	
Masterarbeit incl. Colloquium	30
	30
Gesamt	**120**

Studienverlaufsplan "Energy Materials"

	CP
1. Semester (WS)	
Materials Chemistry II	8
Materials Physics	8
Mineral Materials I	4
Metallic Materials I	4
Process Technology	8
	32
2.Semester (SS)	
Materials Physics and Design II	6
Software Tools for Integrated Computational Materials Design	4
Fundamentals of Corrosion Science	8
Surface and Interface Structure and Processes	5
Interface Theory and Computational Electrocatalysis	5
	28
3. Semester (WS)	
Fundamentals of Fracture Mechanics	8
AI for Accelerated Materials Modeling and Design	3
Ceramics in Energy Technology	6
Metal-Hydrogen Systems: Fundamentals and Applications	3
Wahlpflichtbereich	10
	30
4.Semester (SS)	
Masterarbeit incl. Colloquium	30
	30
Gesamt	**120**

Studienverlaufsplan
"Materials Science of Steel"

	CP
1. Semester (WS)	
Materials Chemistry II	8
Materials Physics	8
Mineral Materials I	4
Metallic Materials I	4
Process Technology	8
	32
2.Semester (SS)	
Introduction to Metall Casting	4
Introduction to Metal Forming	4
Sustainable Materials	4
Software Tools for Integrated Computational Materials Design	4
Materials Characterization	3
Introduction to Data Mining and Machine Learning	3
Metallic Materials II (Microstructure, Microscopy, Modelling)	4
Process Metallurgy and Recycling of Iron and Steel	4
	30
3. Semester (WS)	
Materials Physics Lab	7
Materials Science of Steel	8
Sustainable Materials Design	3
Wahlpflichtbereich	10
	28
4.Semester (SS)	
Masterarbeit incl. Colloquium	30
	30
Gesamt	**120**

Studienverlaufsplan "Corrosion Engineering"

	CP
1. Semester (WS)	
Materials Chemistry II	8
Materials Physics	8
Mineral Materials I	4
Metallic Materials I	4
Process Technology	8
	32
2.Semester (SS)	
Introduction to Metal Forming	4
Software Tools for Integrated Computational Materials Design	4
Surface Engineering for Corrosion Protection	5
Introduction to Data Mining and Machine Learning	3
Fundamentals of Corrosion Science	8
Surface and Interface Structure and Processes	5
	29
3. Semester (WS)	
Corrosion Control in Industries	3
Corrosion Lab	8
Materials Design in Corrosion Engineering	5
Metal-Hydrogen Systems: Fundamentals and Applications	3
Wahlpflichtbereich	10
	29
4.Semester (SS)	
Masterarbeit incl. Colloquium	30
	30
Gesamt	**120**

Studienverlaufsplan "Structural Integrity"

	CP
1. Semester (WS)	
Materials Chemistry II	8
Materials Physics	8
Mineral Materials I	4
Metallic Materials I	4
Process Technology	8
	32
2.Semester (SS)	
Introduction to Metal Forming	4
Sustainable Materials	4
Software Tools for Integrated Computational Materials Design	4
Materials Characterization	3
Fundamentals of Damage Mechanics	8
Introduction to Data Mining and Machine Learning	3
Mechanical Properties of Ceramic Materials	3
	29
3. Semester (WS)	
Corrosion Control in Industries	3
Fundamentals and Solving Methods in Metal Forming	8
Fundamentals of Fracture Mechanics	8
Wahlpflichtbereich	10
	29
4.Semester (SS)	
Masterarbeit incl. Colloquium	30
	30
Gesamt	**120**

Studienverlaufsplan "Sustainable Process Metallurgy and Metal Recycling"

	CP
1. Semester (WS)	
Materials Chemistry II	8
Materials Physics	8
Mineral Materials I	4
Metallic Materials I	4
Process Technology	8
	32
2.Semester (SS)	
Introduction to Metal Casting	4
Transport Phenomena I	4
Digitalization and Artificial Intelligence in Process Automation	4
Process Metallurgy and Recycling of Iron and Steel	4
Process Metallurgy and Recycling of Non-Ferrous Metals	4
Student Mini Thesis (alt. Internship)	10
	30
3. Semester (WS)	
Sustainable Iron and Steel Making: Melt Treatment and Continuou	4
Thermal Operations in Nonferrous Metallurgy	8
Industrial Process Control Seminar	2
Transport Phenomena II	4
Wahlpflichtbereich	10
	28
4.Semester (SS)	
Masterarbeit incl. Colloquium	30
	30
Gesamt	**120**

Studienverlaufsplan "Sustainable Metal Forming and Casting"

	CP
1. Semester (WS)	
Materials Chemistry II	8
Materials Physics	8
Mineral Materials I	4
Metallic Materials I	4
Process Technology	8
	32
2.Semester (SS)	
Introduction to Metal Casting	4
Introduction to Metal Forming	4
Transport Phenomena I	4
Digitalization and Artificial Intelligence in Process Automation	4
Process Metallurgy and Recycling of Iron and Steel	4
Student Mini Thesis (alt. Internship)	10
	30
3. Semester (WS)	
Fundamentals and Solving Methods in Metal Forming	8
Materials, Processes and Simulation Methods in Foundry Technology	8
Industrial Process Control Seminar	2
Process Control Systems	4
Wahlpflichtbereich	6
	28
4.Semester (SS)	
Masterarbeit incl. Colloquium	30
	30
Gesamt	**120**

Appendix 2: Guidelines for Internships

An internship can be completed as an alternative to a research paper upon application to the Examination Board and is usually completed in industry. If no such internship opportunities are available, students have the option of completing an internship at a major research institution (Fraunhofer, Helmholtz, Max Planck Society, etc.). This requires the approval of the Examination Board.

Objectives

The internship is intended to give students some insight into their chosen professional field, provide them with valuable experiences that guide them in their future career choice, and allow them to get a feel for the social structures at an industrial company. By familiarizing themselves with industrial processes, students shall gain a better understanding of specific topics in their course of study.

Duration

The company internship placement must be at least 10 weeks.

Specifications:

The internship (practical work experience component) is to be completed during the lecture-free period. The focus of the internship should be closely related to the chosen specialization. Students must choose an internship supervisor in consultation with the examination board. All professors of the master's course of study in materials engineering may serve as internship supervisors. Students shall select which department to complete their internship in consultation with their host company and, possibly, the Examination Board. The internship should enable the student to acquire knowledge of the production and processing of materials and gain insights into operational processes in industry.

Students shall complete their internship in Europe or at a German company at any location in the world. If they need help with arranging an internship, students can turn to the respective trade associations, whose contact details can be obtained from the department office or through the department's institutes.

Earning Credit for Internships:

Presentation

Students must give a presentation about their internship at the institute of their supervising professor. The type and duration of this presentation shall be determined in consultation with the supervisor. After students have held their presentation and a subsequent discussion has taken place, the professor will issue a certificate, which the students must submit to the examination board along with their internship certificates to have their practical training recognized and credited.

Internship Certificate

After completion of the internship, students must ask their training company for an internship certificate. In addition to listing the exact designation of the company site and the training department, information must be provided on the date and time, duration, and activities performed. Students are not required to write an internship report.

Accreditation:

The Examination Board of the Master's Course of Study in Materials Engineering is responsible for officially recognizing the internship. Students shall earn credit based on their internship certificate in combination with proof of having held a presentation.