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Please note: This publication is an English translation of the Examination Regulations for the M.Sc. MME-CAME created by RWTH International Academy. Only the German original of these regulations as published in the Official Announcements of RWTH Aachen University ("Amtliche Bekanntmachungen") is legally binding.

Program-Specific Examination Regulations

for the Master's degree program

Master of Science in Management and Engineering

in Computer Aided Mechanical Engineering (MME-CAME)

of RWTH Aachen University

dated September 4, 2020

(2020 version of the Examination Regulations)

On the basis of §§ 2 para. 4, 64 of the law governing the universities of the Federal State of North Rhine-Westphalia (Higher Education Act – HEA) in the version of the announcement from September 16, 2014 (GV. NRW p. 547), most recently amended by article 10 of the Act on the coherent and solidary management of the COVID-19 pandemic in North Rhine-Westphalia and on the adaptation of state law with regard to the effects of a pandemic from April 14, 2020 (GV. NRW p. 218b, corr. p. 304a), RWTH Aachen University (RWTH) has issued the following Examination Regulations:

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- Curriculum
 Objectives of this Master's degree program
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I. General Information

§ 1 Scope of Application and Academic Degree

- (1) These Examination Regulations apply to the Master's degree program Master of Science in Management and Engineering in Computer Aided Mechanical Engineering (MME-CAME) at RWTH Aachen University. They apply in conjunction with the General Examination Regulations (GER) in their relevant applicable version only, and include additional program-specific regulations. In cases of doubt, the General Examination Regulations take precedence over the program-specific Examination Regulations.
- (2) After the successful completion of the Master's degree program, the Faculty of Mechanical Engineering awards the academic degree of Master of Science RWTH Aachen University (M. Sc. RWTH).

§ 2 Type and Objectives of the Study Program and Language Provisions

- (1) This is a Master's degree program for the purpose of further education according to § 2 para. 4 GER.
- (2) The overall educational objectives are set out in § 2 para. 1, 3 and 4 GER. For further information and provisions on the objectives of this Master's degree program, please refer to appendix 2 of the present Examination Regulations.
- (3) Teaching takes place in the English language.

§ 3 Admission Requirements

- (1) Requirement for admission is a recognized first degree from a recognized university according to § 3 para. 4 GER.
- (2) To meet the educational prerequisites and successfully complete the Master's degree program Master of Science in Management and Engineering in Computer Aided Mechanical Engineering, the applicant must have the necessary competence in the following areas:
 - A total of 110 Credit Points from the fields of engineering, mathematics and natural sciences. The proven performances must be comparable to the Bachelor's degree program Mechanical Engineering at RWTH Aachen.
 - A total of 10 Credit Points from the fundamentals in business administration and economics. The proven performances must be comparable to the Bachelor's degree program Mechanical Engineering or to the Bachelor's degree program Business Administration and Engineering: Mechanical Engineering at RWTH Aachen University.

 Mathematics I 					
 Mathematics II 					
 Mathematics III 					
- Mechanics I					
 Mechanics II 					
 Mechanics III 	70 CP				
 Material Science I 					
 Thermodynamics I/II 					
 Machine Design I /Introduction into CAD 					
 Computer science in mechanical engineering 					
- Physics					
 Fluid Mechanics 					
 Control Engineering 					
 Fundamentals of Finite Element Method 					
 Simulation Technology 	40 CP				
 Fundamentals of Dynamics of Machines and Structural Dynamics 					
 Construction Design Theory I 					
 Manufacturing Technology I 					
Fundamentals in Business Administration and Economics:					
 Introduction to Business Administration 					
 Management Accounting and Bookkeeping 	10 CP				
 Production and Logistics 	IU CP				
 Quantitative Methods 					
 Sales and Procurement 					

In addition, all applicants are required to successfully pass the Graduate Record Examination (GRE) General Test. Applications without the GRE will not be considered. The following minimum scores must be achieved in the individual sections:

Verbal Reasoning:	145 points
Quantitative Reasoning:	160 points
Analytical Writing:	3 points

Applicants who are citizens of a member state of the European Union or the European Economic Area (EEA), as well as graduates with a Bachelor's degree from a German university are exempt from this rule.

- (3) When admission is granted on condition of completion of additional requirements, § 3 para. 6 GER applies. If additional requirements corresponding to more than 30 Credit Points are required, admission to the Master's degree program is not possible.
- (4) For this Master's degree program, proof of adequate proficiency in the English language must be provided according to § 3 para. 9 GER.
- (5) § 3 para. 12 GER applies for determining whether admission requirements are met.
- (6) General regulations on the recognition of prior examination performances are stated in § 13 GER.

§ 4 Standard Period of Study, Curriculum, Credit Points and Scope of Study

- (1) The standard period of study is four semesters (two years) full-time, including preparation of the Master's thesis. This degree program can only be commenced in the winter semester.
- (2) This program consists of two general compulsory areas (Mechanical Engineering and Management), one compulsory area as per the chosen track as well as one compulsory elective area as per the chosen track. Students must complete one of the two offered tracks *Modelling and Simulation Engineering* or *Digital Engineering*. In addition, a language course must be completed. A total of 120 Credit Points must be acquired to successfully complete this program. The Master's examination is composed as follows:

General Compulsory Area Mechanical Engineering	20 CP
Compulsory Area Mechanical Engineering as per the	
track (Modelling and Simulation Engineering / Digital	
Engineering)	25 CP
Compulsory Elective Area Mechanical Engineering as	
per the track (Modelling and Simulation Engineering /	
Digital Engineering)	13 CP
General Compulsory Area Management	30 CP
Language Course (Compulsory)	2 CP
Master's Thesis	30 CP
Sum	120 CP

- (3) This program comprises 19 to 21 modules, including the Master's thesis module. The weighting of the examinations with Credit Points to be taken in the individual modules is carried out in compliance with § 4 para. 4 GER.
- (4) In administering this program, RWTH International Academy gGmbH ensures that the standard period of study can be adhered to, and that the modules required for a degree in particular and the corresponding examinations as well as the Master's thesis can be completed within the scheduled time frame and deadlines.

§ 5 Obligatory Attendance in Classes

- (1) According to § 5 para. 2 GER, obligatory attendance can only be stipulated in courses of the following type:
 - 1. Tutorials
 - 2. Seminars
 - 3. Colloquia
 - 4. (Laboratory) practicals
 - 5. Simulation games
- (2) Courses for which attendance is compulsory according to para. 1 are identified as such in the module handbook.

- (1) General regulations on examinations and examination periods are stipulated in § 6 GER.
- (2) If the successful participation in modules or examinations or passing of module components according to § 5 para. 4 GER is stipulated as a precondition for participation in other examinations, this is indicated in the module handbook, accordingly.

§ 7 Types of Examinations

- (1) General regulations on types of examination are stipulated in § 7 GER.
- (2) In accordance with § 7 para. 1 GER The following other forms of examination are allowed:
 - 1. In <u>simulation games</u>, students learn to implement the given company projects in teams (small groups) while assuming a defined assigned role. Simulation games can be computer-aided on the basis of programmed software or without such software. Students make active (managerial) decisions on the basis of defined rules and content discussed in the other modules, which are to be implemented in actions. Simulation games can be offered in co-operation with one or more university lecturers, or together with management practice. The latter may evaluate the results as a jury.
 - 2. Special didactical modules are project modules and can involve e.g. <u>case study work and case study discussions</u>, a <u>video interview</u> or a <u>video description</u> as examination. In project modules with special didactical formats, students learn to work together in teams and to successfully implement content covered in other modules. The focus of project modules with special didactical formats can either be on theory or on application. Topics and content of project modules may be defined on a semester-specific basis.
- (3) The duration of a written examination is ...
 - 60 to 90 minutes for up to 5 Credit Points awarded
 - 90 to 120 minutes for 6 or 7 Credit Points awarded
 - 120 minutes or more for 8 or more Credit Points awarded.
- (4) The duration of an oral examination is at least 15 and at most 60 minutes. An oral examination as a group examination is carried out with no more than four candidates.
- (5) The following applies to seminar papers and term papers: the length of a written seminar paper or term paper is at least 10 and at most 100 pages. The time frame for completing a written seminar paper or term paper should be based on the scope of the Credit Points awarded (30 hours per Credit Point).
- (6) The scope of a written paper is 10 to 20 pages. The time frame for completing a written paper is at least 75 and at most 150 hours.
- (7) The following applies to project work in particular: in a project, students should in a small group under tutelage independently work out the solution to a narrowly defined, scientific problem, describe it in writing and present it. The scope of a written work is at least 10 and at most 100

pages. The time frame should be based on the scope of the Credit Points awarded (30 hours per Credit Point). The duration of the presentation is at least 10 and at most 45 minutes.

- (7) The scope of a written preparation for a presentation is 5 to 10 pages. The duration of a presentation is 15 to 45 minutes.
- (8) The following applies to colloquia in particular: The duration of a colloquium is 30 minutes at least and 60 minutes at most.
- (9) At the start of a course, the examiner specifies the duration of the examination and, if applicable, other modalities of the examination.
- (10) Admission to module examinations may be conditional on the successful completion of module components as pre-examination within the meaning of § 7 para. 15 GER. For the relevant modules, this will be outlined in the module handbook. At the start of the semester and no later than by the time of the first course session, the lecturer provides precise criteria in the CMS regarding possible improvement of grades through the completion of module components, particularly the amount and type of tutorials qualifying for bonus as well as the mode of correction and evaluation.

§ 8 Assessment and Grading

- (1) General regulations on assessing the examinations and the formation of grades are included in § 10 GER.
- (2) If an examination consists of several tests, each test must be passed, or have a grade of at least "sufficient" (4.0).
- (3) A module has been passed, if all associated partial examinations have been passed with a grade of at least "sufficient" (4.0), and all other Credit Points or module components have been achieved.
- (4) The overall grade is formed by taking into account all module grades and the grade of the Master's thesis according to § 10 para. 10 GER.
- (5) In the case that all module examinations of the Master's degree program have been completed within the standard period of study, one weighted module grade corresponding to 5 Credit Points can be removed from the student's academic record according to § 10 para. 13 GER.

§ 9 Examination Board

The responsible Examination Board according to § 11 GER is the Master's Examination Board Business Administration and Engineering of the Faculty of Mechanical Engineering.

§ 10 Repeating Examinations or the Master's Thesis and the Loss of Right to Examination

- (1) General regulations on repeat examinations, the Master's thesis, and the loss of right to examinations are stipulated in § 14 GER.
- (2) Freely selectable modules within an area of this Master's degree program can be replaced upon application to the Examination Board as long as no examination has been taken and as long as it is permitted in the relevant module handbook. It is not possible to change compulsory modules.
- (3) A specialization area (track) of this Master's degree program can be changed once upon application to the responsible Examination Board, provided the track in question has not yet been ultimately failed.

§ 11 Deregistration, Non-Attendance, Withdrawal, Deception, Non-Compliance

- (1) General provisions on deregistration, non-attendance, withdrawal, deception or noncompliance are stipulated in § 15 GER.
- (2) The following applies to deregistration from practical work and seminars: deregistration from block courses is possible up to one day before the day of the first course.
- (3) With special didactical modules, a candidate may deregister from an examination up to two weeks before the first relevant day of examination without stating reasons.

II. Master's Examination and Master's Thesis

§ 12 Type and Scope of the Master's Examination

- (1) The Master's examination consists of
 - examinations that are to be completed based on the structure of the study program according to § 4 para. 2 and detailed in the module handbook according to appendix 1, as well as
 - 2. the Master's thesis and the Master's colloquium.
- (2) The order of courses is based on the curriculum (appendix 1). The assignment of the Master's thesis can only be issued if 80 Credit Points have been attained.

§ 13 Master's Thesis

- (1) General regulations for the Master's thesis are set out in § 17 GER.
- (2) Regard to supervision of the Master's thesis, reference is made to § 17 para. 2 GER.

- (3) The Master's thesis is written in the English language.
- (4) The time frame for students to complete their Master's thesis is usually a minimum of 18 and a maximum of 22 weeks alongsides studies. In justified exceptional cases, the time frame can be extended by a maximum of up to six weeks upon application to the Examination Board in accordance with § 17 para. 7 GER. The scope of the written work should not exceed 80 pages without annexes.
- (5) The candidate presents the results of the Master's thesis as part of a Master's colloquium. § 7 para. 12 GER in connection with § 7 para. 8 apply accordingly. It is possible to hold the Master's colloquium before submission of the Master's thesis. The Master's colloquium is to be held 4 weeks after submission of the written Master's thesis at the latest.
- (6) The workload for preparing and composing the Master's thesis as well as for the colloquium corresponds to 30 Credit Points. The grading of the Master's thesis can only be carried out after completion of the Master's colloquium.

§ 14 Acceptance and Assessment of the Master's Thesis

- (1) General provisions on acceptance and assessment of the Master's thesis are included in § 18 GER.
- (2) The Master's thesis must be submitted in due time in duplicate copies to the Central Examination Office (Zentrales Prüfungsamt, ZPA). The copies must be printed and bound. Additionally, the thesis must be submitted as a PDF file on a data storage device.

III. Final Provisions

§ 15 Viewing of Examination Files

Review of exam documents is carried out in accordance with § 22 GER.

§ 16 Coming into Effect, Publication and Transitional Provisions

- (1) These Examination Regulations are published in the Official Announcements of RWTH Aachen University ("Amtliche Bekanntmachungen") and will come into effect on the day after their publication.
- (2) These Examination Regulations apply to all students who enroll or enrolled in the Master's degree program Master of Science in Management and Engineering in Computer Aided Mechanical Engineering at RWTH in or after the Winter Semester 2020/2021.

- (3) Students who enrolled in this Master's degree program before the Winter Semester 2020/2021 may apply to transfer to the present Examination Regulations. The program-specific Examination Regulations dated July 14, 2017 in their currently valid version will apply to these students until the end of the Summer Semester 2023 (September 30, 2023) at maximum. After the end of the Summer Semester 2023, it is mandatory to transfer to the present Examination Regulations.
- (4) Examinations completed based on the Examination Regulations dated July 14, 2017 in their second revised version dated October 15, 2019 in their currently valid version are transferred to the examinations required by the present Examination Regulations in accordance with the equivalence list in appendix 3.

Issued based on the resolutions of the Faculty Council of the Faculty of Mechanical Engineering dated November 19, 2019 and March 3, 2020.

It should be noted that, according to § 12, para. 5 of the law governing the universities of the Federal State of North Rhine-Westphalia (Higher Education Act - HEA), a violation of procedural or formal regulations of the regulatory law or other autonomous law of the university can no longer be asserted after the expiry of one year from the date of this announcement, unless

- 1) the regulations were not duly announced,
- 2) the rector's office has previously objected to the decision of the body deciding the regulations,
- 3) the university has been notified in advance of the formal or procedural defect, indicating the legal provision that has been violated and the fact that gives rise to the defect.
- 4) the legal consequences of the exclusion of the right of appeals was not pointed out when the regulations were published.

The Rector of RWTH Aachen University

Aachen, September 4, 2020

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

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Total CP RWTH Aachen - Track: Modelling and Simulation Engineering	LI WY	Total CP RWTH Aachen - Track: Modelling and Simulation Engineering	120		8		ອ		30		80		

Green highlighted: Specialisation courses for the track: Modelling and Simulation Engineering

Appendix 1: Curricula

Moddeling and Simulation Engineering

RWTH International Master ab WS 2020	Management and Engineering in Computer Aided Mechanical Engineering (MME-CAME) Track: Digital Engineering
RWTH International N	Management and Enginee Track: Digital Engineering

Organge highlighted: Specialisation courses for the track: Digital Engineering

Digital Engineering

Appendix 2: Objectives of this Master's degree program

This Master's degree program was designed as a postgraduate continuation of fundamental Bachelor degree programs in engineering, and aims at an in-depth, vocationally qualifying specialization in the specializations in Modelling and Simulation as well as Digital Engineering.

The specialization Modelling and Simulation focuses on computer-aided modelling and simulation techniques, computer-aided construction design of components, assemblies and computer-aided production in mechanical engineering as well as on the design of production processes, predicting life-cycles of materials, parts and components. Graduates thus have in-depth knowledge in applying computer-aided design software for designing and producing complex technical solutions for construction tasks in the field of Mechanical Engineering.

In the specialization Digital Engineering, students acquire advanced knowledge and skills for a progressively digitally interconnected and collaborative manner of working. After successfully completing the program, graduates will have a thourough understanding of controlling and creating integrated production. They will also be able to evaluate the technological trends and developments relevant to their work and to bring projects to success in an international context.

This Master's degree program qualifies students to work scientifically and in both its specialization areas, it conveys specialized theoretical and analytical knowledge regarding expertise and methods in engineering and economics.

Additionally, graduates will be capable of taking on management tasks independently and responsibly. Graduates will have acquired communicative skills and understand the technical, economic and cultural challenges and areas of conflict in an international context. They will be able to realize projects entrusted to them in a solution-oriented and goal-oriented manner. In addition, graduates can constantly and independently update their knowledge. They can use it creatively to gain new insights and solve problems and have a critical awareness of the complexity of the intersectional tasks of engineering and economic science. They furthermore have the knowledge and skills to recognize new developments and technologies at an early stage and to evaluate their significance for the respective assignment.

Appendix 3: Equivalence list

Master of Science in Management and Engineering in Computer Aided Mechan	ical Engine	ering (MME-CAME) Äquivalenzliste Übergang PO 2016 zu PO 2020	
Module Prüfungsordnung 2016		Module PO 2020	CP
Advanced Finite Element Methods (P)	5	Advanced Finite Element Methods (WP)	5
Numerical Methods in Mechanical Engineering (P)	7	Numerical Methods in Mechanical Engineering (WP)	7
Advanced Software Engineering (P)	5	Advanced Software Engineering (P)	5
Simulation of Discrete Event Systems (P)	5	Simulation of Discrete Event Systems (WP)	5
Reliable Simulation in the Mechanics of Materials and Structures (P)	6	Failure of Structures and Structural Elements (P)	5
Continuum Mechanics (P)	5	Continuum Mechanics (P)	5
Nonlinear Structural Mechanics (P)	5	Nonlinear Structural Mechanics (P)	5
		Quality Management (P)	6
		Advanced Control Systems (P)	4
		Management and Engineering Perspectives (P)	5
		Intelligent Monitoring of Engineering Systems (P)	5
		Computational Intelligence in Engineering (P)	5
Multibody Dynamics (WP)	5	Multibody Dynamics (WP)	5
Welding and Joining Technologies (WP)	5	Welding and Joining Technologies (WP)	5
Manufacturing Technology II (WP)	5	Manufacturing Technology II (P)/(WP)	5
Factory Planning (WP)	5	International Factory Planning (P)/(WP)	5
Modeling, Model Reduction and Simulation in Laser Processing - Design (WP)	5	Modeling, Model Reduction and Simulation in Laser Processing - Design (WP)	5
Mechanics of Engineering Materials (WP)	5	Mechanics of Engineering Materials (WP)	5
		Fundamentals of Lightweight Design (WP)	4
		Machine Tools (WP)	5
		Artificial Neural Networks in Structural Mechanics (WP)	6
		Mechatronics and Control Techniques for Production Plants (WP)	5
		Control Engineering (WP)	3
		Digital Work: Challenges and Solutions (WP)	5
		Modelling, Model Reduction and Simulation in Laser Processing - Applications (WP)	5
		Additive Manufacturing I - Technologies and Processes (WP)	6
		Tensor Algebra and Tensor Analysis for Engineering Students I (WP)	5
		Production Management A (P)	5
		Artificial Intelligence and Data Analytics for Engineers (P)	5
		Embedded Systems (P)	5
		Laser Applications (WP)	6
Entrepreneurial Strategy (P)	5	Strategic Management (P)	5
Innovation Management (P)	5	Marketing Management (P)	5
Finance and Accounting (P)	5	Management Accounting (P)	5
International Project Management (P)	5	Financial Management (P)	5
Organizational Development and Change (P)	5		
Economics for Managers (P)	5		
International Business (P)	5	International Business (P)	5
Leadership and High Perfomance Teams (P)	5	Human Resource Management (P)	5
Professional Negotiation Skills and Management of Conflicts (P)	5		
German Language Course (P)	2	Language Course (P)	2
Marta Thank (D)		Manatan Than I. (D)	
Master Thesis (P)	25	Master Thesis (P)	30