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Part B:

Study and Examination Regulations for the Master's degree program Advanced Materials and Manufacturing at Aalen University (Part MA-TB-AMM-32)

from April 28, 2021

Reading version from April 28, 2021

On the basis of § 8 para. 5 in conjunction with § 32 of the Baden-Württemberg Higher Education Act (Landeshochschulgesetz LHG) in the version of January 1, 2005 (GBl. p.1), last amended by Article 1 of the Act of March 13, 2018 (GBl. p. 85), in the version as of March 30, 2018, the Senate of Aalen University adopted the following examination regulations on April 14, 2021. The Rector approved these study and examination regulations (part MA-TB-AMM-32) by decree dated April 28, 2021.

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§ 1 General

For Part B of the study and examination regulations of the Advanced Materials and Manufacturing degree program "MA-TB-AMM-32", the general regulations Part A "MA-TA-20-1" apply in the currently valid version.

§ 2 Study program Advanced Materials and Manufacturing

I - Preamble - Qualification goals

The Master's degree program is a research-oriented training and further education program with a specialist focus on materials and manufacturing technology, whereby the area of product development is also addressed. By successfully completing the Master's program, students are able to independently plan, carry out and complete research and development projects (R&D projects) and transfer the knowledge gained.

Graduates are thus able to analyze and present research-oriented technical-scientific issues and draw conclusions independently and as part of a team. Students are able to evaluate complex technical-scientific issues and problems and independently develop possible solutions. This means that they are able to solve technical-scientific tasks, interpret and critically discuss the results obtained and extract findings. This includes the ability to present the results and findings precisely and comprehensibly both in written form (as part of research reports, a Master's thesis and a scientific publication) and in poster and lecture form (e.g. as part of research presentations). In addition to specific specialist skills, students acquire methodological skills that enable them to solve complex technical and scientific problems in a systematic and structured manner.

Particular emphasis is placed on the acquisition of sound scientific and engineering knowledge - with in-depth study in accordance with the chosen research topic. The specialist skills range from material selection and development in line with requirements, material testing and material analysis to the development of associated process technologies for the production, processing and machining of materials. In the field of production engineering, the specialist skills lie in the selection, evaluation and (further) development of suitable manufacturing and machining processes for specific manufacturing tasks such as additive manufacturing, foundry technology, robot-assisted automation or laser-assisted material processing. In addition, students are able to solve complex problems in the field of product development, such as design and testing. In all three areas, students are able to use the appropriate experimental and digital methods and tools to solve the problem and proceed accordingly experimentally and using numerical models and simulations. The specific characteristics and focus depend on the student's chosen research topic.

In addition to working on the chosen research topic, students take two technically-oriented compulsory elective modules from the Master's lecture courses offered at Aalen University, in particular from the courses offered by the Faculty of Mechanical and Materials Engineering, which are chosen specifically for the respective research topic. The selection of the compulsory elective modules is the responsibility of the first supervisor of the research work in consultation with the student. In this way, students acquire in-depth theoretical knowledge in line with their research project work, enabling them to fundamentally address the research questions on the basis of sound specialist knowledge.

Joint lectures and research presentations - the latter serve not least to critically examine research questions that go beyond the student's own research topic - ensure that knowledge is broadened as well as deepened.

In addition to specialist skills, methodological and social skills are also promoted, such as innovation and project management, teamwork, communication skills, language skills, internationality, presentation skills and media skills. The research presentations held in English, in which students present their own results and findings at the end of the semester in the style of a scientific conference to students and lecturers on the course and discuss them critically, make a significant contribution to this.

They are able to take ethical and social aspects into account in their work. They reflect on their professional actions and thus develop a professional self-image.

The research-oriented teaching profile is supported by close cooperation and reciprocal exchange with industry and other research institutions such as other colleges, Fraunhofer Institutes and universities.

Graduates work in a wide range of fields. They are qualified to pursue a doctorate. They also have the skills to take on challenging tasks in research, (production) process development and product development as well as production or quality assurance. These can be located in the line or in projects.

The ability to engage in civil society is anchored in the Studium Generale. Here (e.g. in seminars or through activities in social institutions), students acquire further soft skills and interdisciplinary competencies that are essential for personal development and for their future careers. Personal development also includes future roles in civil society, politics and culture. This enables graduates to discuss current and historical topics, critically reflect on social processes, develop an understanding of different points of view and help shape them with a sense of responsibility and democratic community spirit.

II - Program structure and scope

- (1) The Faculty of Mechanical Engineering/Materials Engineering offers a Master of Science in Materials and Production Engineering for Bachelor's students who have achieved an above-average degree in a relevant Bachelor's program. The number of study places is limited and access is regulated by admission regulations. The study program or individual modules may also be offered in English.
- (2) The Master's program is offered twice a year. The Master's program consists of a total of 3 semesters of standard study time, of which 2 semesters are worth 30 credit points (CP) each and a further semester in which the Master's thesis is completed, which is assessed with 29 CP. In each of the first two semesters, students must complete a research project, which is completed with a research report and a research presentation and is awarded 20 CP.
- (3) The duration and structure of the degree program, modules, courses with the number of hours per week per semester and the number of CP can be found in the following table and in the module handbook for the degree program.
- (4) The Studium Generale is a compulsory module worth 1 CP and must be completed within the study period.
- (5) Upon application, modules/sub-modules from foreign universities can be recognized by the person responsible for the degree program.
- (6) Exclusion from the course: The duration of the entire course, including the Master's thesis, is a maximum of 6 semesters. If the maximum duration is exceeded, admission to the degree program is revoked, unless the student is not responsible for this.

Curriculum of the Master of Science degree program

"Advanced Materials and Manufacturing"

No.	Module / Course	Type	Semester			CP
			SWS			
			1	2	3	
Compulsory modules						
21001	Research module 1					20
21101	Research paper 1 incl. research report and presentation	P, L	x			20
21002	Research module 2					20
21201	Research paper 2 incl. research report and presentation	P, L		x		20
21003	Project management and scientific work					5
21103	Methods and tools of scientific work	V, Ü	2 ¹⁾	2 ¹⁾		5
21203	Innovation and R&D project management	V, Ü	2 ¹⁾	2 ¹⁾		
21004	Innovative processes in materials and production engineering and product development					5
21104	Materials, Manufacturing & Engineering Technology	V, P	2 ²⁾	2 ²⁾		5
21999	General studies					1
					X	1

¹⁾ These courses are always offered in the summer semester and conclude with a written examination. Depending on the start of their studies (summer or winter semester), students take the course either in their first or second semester. The 5 ECTS credits are therefore awarded in the summer semester.

²⁾ This course is complementary to 21003 (Project Management and Scientific Work) and is always offered in the winter semester and concludes with a presentation as an examination. Depending on the start of their studies (summer or winter semester), students take the course either in their first or second semester. The contact time (lectures) is only 2 SWS, as students are required to work on a non-subject-related project parallel to the lecture, which must be presented and defended in the form of a presentation. The 5 ECTS credits are therefore awarded in the winter semester.

No.	Module / Course	Type	Semester			CP
			SWS			
			1	2	3	
	Compulsory elective modules					
21005	Compulsory elective module (WPM) 1 ³⁾					5
21105	Technology I	V	4			5
21006	Compulsory elective module (WPM) 2 ³⁾					5
21106	Technology II	V		4		5
9998	Research master thesis					29
	Master's thesis incl. defense				x	29
	SWS		8*	6**	0	
	CP		30	30	29	
	Examinations		3	3	1	

³⁾ At least 1 compulsory elective module (WPM) must be selected per semester. A total of at least 10 CP must be achieved in the 2 selected WPM. The courses offered in the Master's degree programs at Aalen University, in particular in the Faculty of Mechanical Engineering and Materials Engineering, are available for selection with a pronounced technical character. The designation of the courses as "Technology I/II" is generic in the SPO, as the exact designation depends on the individual selection. The specific name of the selected module will be included later in the certificate. The WPM must be selected by the students together with the respective supervisor of the research modules and approved by the Dean of Studies.

* In the first semester at the beginning of the summer semester (SoSe) or in the second semester at the beginning of the winter semester (WS):

- SWS: 4 SWS "Project management and scientific work" (21003) + 4 SWS "WPM 1" or "WPM 2" (if starting in the winter semester)
- Examinations: "Research module 1" or "Research module 2" (at the beginning of the winter semester), "Project management and academic work", "WPM 1" or "WPM 2" (at the beginning of the winter semester)

** In the second semester if starting in the summer semester or in the first semester if starting in the winter semester:

- SWS: 2 SWS "Innovative processes in materials and production engineering and product development" (21004) + 4 SWS "WPM 2" or "WPM 1" (if starting in the winter semester)
- Examinations: "Research Module 2" or "Research Module 1" (at the beginning of the winter semester), "Innovative Processes in Materials and Production Engineering and Product Development", "WPM 2" or "WPM 1" (at the beginning of the winter semester)

§ 3 Entry into force / transitional provisions

These statutes come into force for the winter semester 2021/22

April 28, 2021

Prof. Dr. G. Schneider

Rector