FH MÜNSTER
University of Applied Sciences

Module Handbook for Master's degree programmes offered by the Department of Mechanical Engineering

Department of Mechanical Engineering

Stegerwaldstraße 39

48565 Steinfurt

Phone: +49 2551 962672

dekanat-mb@fh-muenster.de

www.fh-muenster.de/mb

Version: 2023.2

Last amended: 09.10.2023

MB FB Maschinenbau
Department of Mechanical Engineering

Inhalt

Course timetables for Master’s degree programmes

Degree programmes and specialisations	Valid from enrolment in
Master Mechanical Engineering, Specialisation in Agricultural Engineering	WS 20 / 21
Master Mechanical Engineering, Specialisation in Computational Engineering	WS 20 / 21
Master Mechanical Engineering, Specialisation in Product Development	WS 20 / 21
Master Mechanical Engineering in Part-Time, Specialisation in Agricultural Engineering	WS 20 / 21
Master Mechanical Engineering in Part-Time, Specialisation in Computational Engineering	WS 20 / 21
Master Mechanical Engineering in Part-Time, Specialisation in Product Development	WS 20 / 21
Master Business Administration & Engineering majoring in Mechanical Engineering	see ITB

Note:

Course timetables are governed by the Examination Regulations applicable at the time of enrolment.

The course timetables below reflect the status of the most recent Examination Regulations / amendment orders.

Abbreviations:

HPW = hours per week per semester

CP = credit points

L = lecture

S = seminar

SL = seminaristic lecture (exercise class)

E = exercise

P = practical course (laboratory class)

Additional abbreviations for Master’s programmes in Mechanical Engineering

Full-Time = “FT”“

Part-Time = “P” or “PT”

Master in Mechanical Engineering

Compulsory engineering modules

Compulsory elective engineering modules

Apart from the compulsory elective engineering modules, mentioned, students may also opt to take any of the elective or compulsory engineering modules from the other specialisations. In these cases, however, the Department of Mechanical Engineering is unable to guarantee that there will be no timetable clashes.

Integration modules

Practical modules

Specialisation in Agricultural Engineering

1st sem.	Agricultural Engineering 1	Drive Systems	Advanced Fluid Machines	Advanced Mathematics	Advanced Technical Mechanics
2nd sem.	Plant Design / Fatigue Strength and Durability	Agricultural Engineering 2	Agricultural Process Technology	Piston Engines	Project Report
3rd sem.	Conveying Technology / Automotive Engineering	Renewable Resources	The German Legal System and Product Liability	Management Skills – Organisation and Leadership	Scientific Project
4th sem.	Master Thesis				Colloquium

Specialisation in Computational Engineering

1st sem.	Operations Research	Drive Systems	Multibody Simulation	Advanced Mathematics	Robotics
2nd sem.	Knowledge-Based Engineering	Modern Programming Concepts	Application of Numerical Software	Developments in Computer Science	Project Report
3rd sem.	Advanced Finite Element Methods	Machine Tools	The German Legal System and Product Liability	Management Skills – Organisation and Leadership	Scientific Project
4th sem.	Master Thesis				Colloquium

Specialisation in Product Development

1st sem.	Conveying Technology	Drive Systems	Advanced Fluid Machines	Advanced Mathematics	Advanced Technical Mechanics
2nd sem.	Material Flow Seminar / Polymer Engineering	Integrated Product Development	Dynamics of Machines	Piston Engines	Project Report
3rd sem.	Advanced Finite Element Methods / Technology of Mechanisms	Machine Tools	The German Legal System and Product Liability	Management Skills – Organisation and Leadership	Scientific Project
4th sem.	Master Thesis				Colloquium

– Specialisation in Agricultural Engineering

Subjects			1st sem.			2nd sem.			3rd sem.			4th sem.		
	HPW	CP	L	E	P	L	E	P	L	E	P	L	E	P
Compulsory engineering modules		**66**												
Drive Systems	6	6	3	2	1									
Advanced Mathematics	6	6	4	2	0									
Advanced Fluid Machines	6	6	3	2	1									
Advanced Technical Mechanics	5	6	3	2	0									
Agricultural Engineering 1	5	6	3	1	1									
Agricultural Process Technology	5	6				3	1	1						
Piston Engines	6	6				3	1	2						
Agricultural Engineering 2	5	6				3	1	1						
Management Skills – Organisation and Leadership	5	6							3	2	0			
Renewable Resources	5	6							3	1	1			
The German Legal System and Product Liability	4	6							3	1	0			
Compulsory elective engineering modules		**12**												
Compulsory elective engineering module 1		6				x	x	x						
Compulsory elective engineering module 2		6							x	x	x			
Practical modules		**42**												
Project Report		6				x	x	x						
Scientific Project		6							x	x	x			
Master Thesis		25										x	x	x
Colloquium		5										x	x	x
		120												

Catalogue of compulsory elective engineering modules						2nd sem.			3rd sem.					
	HWP	CP				L	E	P	L	E	P			
Advanced English	4	6				0	4	0						
Plant Design	4	6				3	1	0						
Fatigue Strength and Durability	5	6				3	1	1						
Automotive Engineering	5	6							3	1	1			
Conveying Technology	5	6							2	2	1			

Apart from the compulsory elective engineering modules, mentioned, students may also opt to take any of the elective or compulsory engineering modules from the other specialisations. In these cases, however, the Department of Mechanical Engineering is unable to guarantee that there will be no timetable clashes.

Students may complete a literature-based study in place of a compulsary elective module.

– Specialisation in Computational Engineering

Subjects			1st sem.			2nd sem.			3rd sem.			4th sem.		
	HPW	CP	L	E	P	L	E	P	L	E	P	L	E	P
Compulsory engineering modules		**66**												
Drive Systems	6	6	3	2	1									
Advanced Mathematics	6	6	4	2	0									
Multibody Simulation	5	6	2	1	2									
Operations Research	5	6	3	1	1									
Robotics	5	6	2	1	2									
Application of Numerical Software	5	6				2	1	2						
Developments in Computer Science	4	6				2	1	1						
Modern Programming Concepts	5	6				2	1	2						
Management Skills – Organisation and Leadership	5	6							3	2	0			
The German Legal System and Product Liability	4	6							3	1	0			
Machine Tools	6	6							3	1	2			
Compulsory elective engineering modules		**12**												
Compulsory elective engineering module 1		6				x	x	x						
Compulsory elective engineering module 2		6							x	x	x			
Practical modules		**42**												
Project Report		6				x	x	x						
Scientific Project		6							x	x	x			
Master Thesis		25										x	x	x
Colloquium		5										x	x	x
		120												
Catalogue of compulsory elective engineering modules						**2nd sem.**			**3rd sem.**					
	HWP	**CP**				**L**	**E**	**P**	**L**	**E**	**P**			
Advanced English	4	6				0	4	0						
Knowledge-Based Engineering	5	6				2	1	2						
Advanced Finite Element Methods	5	6							2	1	2			

Apart from the compulsory elective engineering modules, mentioned, students may also opt to take any of the elective or compulsory engineering modules from the other specialisations. In these cases, however, the Department of Mechanical Engineering is unable to guarantee that there will be no timetable clashes.

Students may complete a literature-based study in place of a compulsary elective module.

– Specialisation in Product Development

Subjects			**1st sem.**			**2nd sem.**			**3rd sem.**			**4th sem.**		
	HPW	**CP**	**L**	**E**	**P**	**L**	**E**	**P**	**L**	**E**	**P**	**L**	**E**	**P**
Compulsory engineering modules		**66**												
Drive Systems	6	6	3	2	1									
Conveying Technology	5	6	2	2	1									
Advanced Mathematics	6	6	4	2	0									
Advanced Fluid Machines	6	6	3	2	1									
Advanced Technical Mechanics	5	6	3	2	0									
Integrated Product Development	5	6				3	2	0						
Piston Engines	6	6				3	1	2						
Dynamics of Machines	5	6				3	2	0						
Management Skills – Organisation and Leadership	5	6							3	2	0			
The German Legal System and Product Liability	4	6							3	1	0			
Machine Tools	6	6							3	1	2			
Compulsory elective engineering modules		**12**												
Compulsory elective engineering module 1		6				x	x	x						
Compulsory elective engineering module 2		6							x	x	x			
Practical modules		**42**												
Project Report		6				x	x	x						
Scientific Project		6							x	x	x			
Master Thesis		25										x	x	x
Colloquium		5										x	x	x
		120												

Catalogue of compulsory elective engineering modules						**2nd sem.**			**3rd sem.**					
	HWP	**CP**				**L**	**E**	**P**	**L**	**E**	**P**			
Advanced English	4	6				0	4	0						
Material Flow Seminar	4	6				1	1	2						
Polymer Engineering	5	6				3	1	1						
Technology of Mechanisms	5	6							3	2	0			
Advanced Finite Element Methods	5	6							2	1	2			

Apart from the compulsory elective engineering modules, mentioned, students may also opt to take any of the elective or compulsory engineering modules from the other specialisations. In these cases, however, the Department of Mechanical Engineering is unable to guarantee that there will be no timetable clashes.

Students may complete a literature-based study in place of a compulsary elective module.

Master Mechanical Engineering (Part-Time)

Compulsory engineering modules

Compulsory elective engineering modules

Apart from the compulsory elective engineering modules, mentioned, students may also opt to take Advanced English and any of the elective or compulsory engineering modules from the other specialisations. In these cases, however, the Department of Mechanical Engineering is unable to guarantee that there will be no timetable clashes. Students may complete a literature-based study in place of a compulsary elective module.

Integration modules

Practical modules

Specialisation in Agricultural Engineering

				Lecture Day
1st sem.	Advanced Mathematics	Drive Systems	Advanced Technical Mechanics	Mon Tue
2nd sem.	Agricultural Process Technology	Piston Engines	Project Report	Mon Tue
3rd sem.	Advanced Fluid Machines	Agricultural Engineering 1	The German Legal System and Product Liability	Thu Fri
4th sem.	Plant Design / Fatigue Strength and Durability	Agricultural Engineering 2	Scientific Project	Thu Fri
5th sem.	Conveying Technology / Automotive Engineering	Renewable Resources	Management Skills – Organisation and Leadership	Thu Fri
6th sem.	Master Thesis		Colloquium	

Specialisation in Computational Engineering

1st sem.	Advanced Mathematics	Drive Systems	Multibody Simulation	Mon Tue
2nd sem.	Modern Programming Concepts	Developments in Computer Science	Project Report	Mon Tue
3rd sem.	Operations Research	Robotics	The German Legal System and Product Liability	Thu Fri
4th sem.	Knowledge-Based Engineering	Application of Numerical Software	Scientific Project	Thu Fri
5th sem.	Advanced Finite Element Methods	Machine Tools	Management Skills – Organisation and Leadership	Thu Fri
6th sem.	Master Thesis		Colloquium	

Specialisation in Product Development

1st sem.	Advanced Mathematics	Drive Systems	Advanced Technical Mechanics	Mon Tue
2nd sem.	Dynamics of Machines	Piston Engines	Project Report	Mon Tue
3rd sem.	Advanced Fluid Machines	Conveying Technology	The German Legal System and Product Liability	Thu Fri
4th sem.	Material Flow Seminar / Polymer Engineering	Integrated Product Development	Scientific Project	Thu Fri
5th sem.	Advanced Finite Element Methods / Technology of Mechanisms	Machine Tools	Management Skills – Organisation and Leadership	Thu Fri
6th sem.	Master Thesis		Colloquium	

– Specialisation in Agricultural Engineering – Part-Time

Subjects			1st sem.			2nd sem.			3rd sem.			4th sem.			5th sem.			6th sem.		
	HPW	CP	L	E	P	L	E	P	L	E	P	L	E	P	L	E	P	L	E	P
Compulsory engineering modules		**66**																		
Drive Systems	6	6	3	2	1															
Advanced Mathematics	6	6	4	2	0															
Advanced Technical Mechanics	5	6	3	2	0															
Agricultural Process Technology	5	6				3	1	1												
Piston Engines	6	6				3	1	2												
Advanced Fluid Machines	6	6							3	2	1									
Agricultural Engineering 1	5	6							3	1	1									
The German Legal System and Product Liability	4	6							3	1	0									
Agricultural Engineering 2	5	6										3	1	1						
Management Skills – Organisation and Leadership	5	6													3	2	0			
Renewable Resources	5	6													3	1	1			
Compulsory elective engineering modules		**12**																		
Compulsory elective engineering module 1		6										x	x	x						
Compulsory elective engineering module 2		6													x	x	x			
Practical modules		**42**																		
Project Report		6				x	x	x												
Scientific Project		6										x	x	x						
Master Thesis		25																x	x	x
Colloquium		5																x	x	x
		120																		
Catalogue of compulsory elective engineering modules												**4th sem.**			**5th sem.**					
	HWP	**CP**										**L**	**E**	**P**	**L**	**E**	**P**			
Advanced English	4	6										0	4	0						
Plant Design	4	6										3	1	0						
Fatigue Strength and Durability	5	6										3	1	1						
Automotive Engineering	5	6													3	1	1			
Conveying Technology	5	6													2	2	1			

Apart from the compulsory elective engineering modules, mentioned, students may also opt to take any of the elective or compulsory engineering modules from the other specialisations. In these cases, however, the Department of Mechanical Engineering is unable to guarantee that there will be no timetable clashes.

Students may complete a literature-based study in place of a compulsary elective module.

– Specialisation in Computational Engineering - Part-Time

Subjects			1st sem.			2nd sem.			3rd sem.			4th sem.			5th sem.			6th sem.		
	HPW	CP	L	E	P	L	E	P	L	E	P	L	E	P	L	E	P	L	E	P
Compulsory engineering modules		**66**																		
Drive Systems	6	6	3	2	1															
Advanced Mathematics	6	6	4	2	0															
Multibody Simulation	5	6	2	1	2															
Developments in Computer Science	4	6				2	1	1												
Modern Programming Concepts	5	6				2	1	2												
Operations Research	5	6							3	1	1									
The German Legal System and Product Liability	4	6							3	1	0									
Robotics	5	6							2	1	2									
Application of Numerical Software	5	6										2	1	2						
Management Skills – Organisation and Leadership	5	6													3	2	0			
Machine Tools	6	6													3	1	2			
Compulsory elective engineering modules		**12**																		
Compulsory elective engineering module 1		6										x	x	x						
Compulsory elective engineering module 2		6													x	x	x			
Practical modules		**42**																		
Project Report		6				x	x	x												
Scientific Project		6										x	x	x						
Master Thesis		25																x	x	x
Colloquium		5																x	x	x
		120																		

Catalogue of compulsory elective engineering modules												4th sem.			5th sem.					
	HWP	CP										L	E	P	L	E	P			
Advanced English	4	6										0	4	0						
Knowledge-Based Engineering	5	6										2	1	2						
Advanced Finite Element Methods	5	6													2	1	2			

Apart from the compulsory elective engineering modules, mentioned, students may also opt to take any of the elective or compulsory engineering modules from the other specialisations. In these cases, however, the Department of Mechanical Engineering is unable to guarantee that there will be no timetable clashes.

Students may complete a literature-based study in place of a compulsary elective module.

– Specialisation in Product Development - Part-Time

Subjects			1st sem.			2nd sem.			3rd sem.			4th sem.			5th sem.			6th sem.		
	HPW	CP	L	E	P	L	E	P	L	E	P	L	E	P	L	E	P	L	E	P
Compulsory engineering modules		**66**																		
Drive Systems	6	6	3	2	1															
Advanced Mathematics	6	6	4	2	0															
Advanced Technical Mechanics	5	6	3	2	0															
Piston Engines	6	6				3	1	2												
Dynamics of Machines	5	6				3	2	0												
Conveying Technology	5	6							2	2	1									
Advanced Fluid Machines	6	6							3	2	1									
The German Legal System and Product Liability	4	6							3	1	0									
Integrated Product Development	5	6										3	2	0						
Management Skills – Organisation and Leadership	5	6													3	2	0			
Machine Tools	6	6													3	1	2			
Compulsory elective engineering modules		**12**																		
Compulsory elective engineering module 1		6										x	x	x						
Compulsory elective engineering module 2		6													x	x	x			
Practical modules		**42**																		
Project Report		6				x	x	x												
Scientific Project		6										x	x	x						
Master Thesis		25																x	x	x
Colloquium		5																x	x	x
		120																		

Catalogue of compulsory elective engineering modules												4th sem.			5th sem.					
	HWP	CP										L	E	P	L	E	P			
Advanced English	4	6										0	4	0						
Material Flow Seminar	4	6										1	1	2						
Polymer Engineering	5	6										3	1	1						
Technology of Mechanisms	5	6													3	2	0			
Advanced Finite Element Methods	5	6													2	1	2			

Apart from the compulsory elective engineering modules, mentioned, students may also opt to take any of the elective or compulsory engineering modules from the other specialisations. In these cases, however, the Department of Mechanical Engineering is unable to guarantee that there will be no timetable clashes.

Students may complete a literature-based study in place of a compulsary elective module.

Master Business Administration & Engineering majoring in Mechanical Engineering

Subjects			1st sem.			2nd sem.			3rd sem.			4th sem.		
	HWS	CP	L	E	P	L	E	P	L	E	P	L	E	P
Compulsory economics modules, see ITB		**49**	x	x	x	x	x	x	x	x	x			
Compulsory elective economics modules, see ITB		**20**	x	x	x	x	x	x	x	x	x			
Compulsory elective engineering modules		**20**	x	x	x	x	x	x	x	x	x			
Practical modules		**31**												
Project Report		5										x	x	x
Master-Thesis		23										x	x	x
Colloquium		3										x	x	x
		120												

Catalogue of compulsory elective engineering modules						SuSe			WiSe					
	HWS	CP				L	E	P	L	E	P			
Agricultural Process Technology	5	6				3	1	1						
Plant Design	4	6				3	1	0						
Application of Numerical Software	5	7				2	1	2						
Fatigue strength and durability	5	6				3	1	1						
Developments in Computer Science	4	6				2	1	1						
Material Flow Seminar	4	6				1	1	2						
Integrated Product Development	5	6				3	2	0						
Knowledge Based Engineering	5	6				2	1	2						
Piston Engines	6	6				3	1	2						
Polymer Engineering	5	6				3	1	1						
Agricultural Engineering 2	5	6				3	1	1						
Dynamics of Machines	5	6				3	2	0						
Automotive Engineering	5	6							3	1	1			
Conveying Technology	5	6							2	2	1			
Technology of Mechanisms	5	7							3	2	0			
Advanced Finite Element Methods	5	6							2	1	2			
Agricultural Engineering 1	5	6							3	1	1			
Operations Research	5	6							3	1	1			
Renewable Resources	5	7							3	1	1			
Robotics	5	7							2	1	2			
Machine Tools	6	6							3	1	2			

Master – module descriptions

Advanced English

1	1.1 Title of module (GER / ENG) **Advanced English / Advanced English (B2/C1)**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0005**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**CE**	**2+3 (FT)/ 4+5 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**CE**	**2+3 (FT)/ 4+5 (PT)**
	Mechanical Engineering - Specialisation Product Development	**CE**	**2+3 (FT)/ 4+5 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Seminar	**4**	**60**	**180**	**6**
	Total	Total contact hours in SWS	Total contact hours in hours **60**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**120**		
	Total		Total non-contact hours **120**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to express engineering issues, both verbally and in writing, in English. They will be able to solve specialist communicative tasks such as graphically displayed data, technical explanations and project descriptions with a view to scientific publications in an international professional field. In addition, students will be able to maintain professional contacts in the foreign language correctly and confidently in terms of language and style.

5.2 Course content

Students systematically develop their ability to write texts and to give oral presentations of technical issues. They will tackle sample texts and create texts related to their own practical experience. They will simulate professional communication situations. The course prepares students for an internationally recognised external examination. In this context, grammatical structures will be specifically refreshed. Special attention is paid to achieving intercultural understanding.

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

You continue to develop your English skills and solve technical/communication tasks. Examples include technical documentation or project descriptions for international use, and scientific publications.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise; module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

Recommended: English (Level B2)

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

Written examination or presentation

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the lecture

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☐ **German** ☒ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

H. Ermen M.A., J.-C. A. Gockel M.A., Dr. A. Hövener M.A.

7.3 Professors (optional):

H. Ermen M.A., J.-C. A. Gockel M.A., Dr. A. Hövener M.A.

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Advanced Finite Element Methods

1	1.1 Title of module (GER / ENG) **Höhere FEM / Advanced Finite Element Methods**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0022**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering	**CE**	**3 (FT) / 5 (PT)**
	Mechanical Engineering - Specialisation Product Development	**CE**	**3 (FT) / 5 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**3**

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**2**	**30**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to describe static and dynamic finite element analysis simulations for single components and assemblies by means of linear algebra, create them using the NX software program, and assess their results. This approach is one of the key steps in designing mechanical components in companies, and is therefore an important aspect of product development.
During lectures and the practical course, students will be enabled to classify challenging issues from the technical area for FEM simulations, and to generate corresponding models. They will be able to differentiate between different groups of nonlinearities in FEM, and to describe and assess the resulting numerical problems. They will be able to develop, analyse and assess manually created FEM calculations on the topics of heat conduction, convection, natural oscillations, buckling, contact and dynamics. They will use different algorithms to model contact, and will be able to assess them and

apply them to new issues. They will be able to incorporate classifiable material nonlinearities into existing and self-developed FEM models.
They will be able to independently create the structure, content, etc. of the element stiffness matrices, heat conduction matrices, convection matrices, mass matrices, damping matrices, geometric stiffness matrices, overall stiffness matrices and load vectors necessary for FEM calculations, also using the functional approach. Students will also be able to analyse and assess boundary conditions and FEM meshes, and to create appropriate meshes and boundary conditions for new issues. They will be able to understand and illustrate the algorithms required to solve nonlinear systems, and to control them. They will also be able to detect and assess explicit and implicit solver algorithms, and to select solver algorithms on the basis of complex issues. In addition, students will be able to apply the Ritz method, which is relevant to FEM, as well as the Galerkin method.
The practical course enables students to develop and apply solution strategies for the set tasks that build on the specialist knowledge gained in the lectures, and to formulate and present the results to suit the target group. Students will be able to use the Siemens NX program package, comprising the pre- and post-processor and the NASTRAN, ADINA or ABAQUS solvers, to construct models for given issues, and to conduct simulations with appropriate linkages. Students will be able to analyse, assess and explain the simulation results. They will also be able to draw conclusions for construction design.

5.2 Course content

- **Field problems (e.g. heat conduction)**
- **Dynamics**
- **Nonlinear phenomena (contact, material nonlinearities, geometric nonlinearities)**
- **Speeding up simulations**
- **Numerical aspects**
- **Ritz method**
- **Application of the software package, comprising the pre- and post-processor NX and the NASTRAN/ADINA or ABAQUS solvers, to issues related to the presented topics**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Using an established FEM software program, you carry out static and dynamic simulations. This is important for the design of mechanical components, preparing you for your future career in production and with companies.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr. rer. nat. E. Finke

7.3 Professors (optional):

Professor Dr. rer. nat. E. Finke

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

- Lecture and practical course notes
- P. Steinke , Finite-Elemente-Methode (Rechnergestützte Einführung), Springer

Advanced Fluid Machines

1	1.1 Title of module (GER / ENG) **Höhere Strömungsmaschinen / Advanced Fluid Machines**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0025**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**1 (FT) / 3 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development	**C**	**1 (FT) / 3 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**2**	**30**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **90**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**90**		
	Total		Total non-contact hours **90**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to express the basic relationships of energy conversion for key turbomachines such as gas, steam and wind turbines, and to independently conduct energy analyses. They will be able to undertake the geometric and fluid flow design of impellers and volutes using selected examples, and to illustrate the principles of the main control methods.

The practical course enables students to independently conduct experiments, to adjust experimental setups according to parameters, and to operate and calibrate electronic measuring instruments. They will also be able to conclusively follow up experiments. This includes mathematical data preparation, the extraction of important variables and, in particular, the complete and clearly structured documentation and presentation of experiments.

	5.2 Course content **Fluid flow design and the calculation of impellers, cascades, nozzles and diffusors; water turbines; steam and gas turbines; hydrodynamic couplings and transmissions; wind turbines; use and conditions of the main regulatory procedures; use of conversion processes, similarity laws and characteristic diagrams** → Details available in the university calendar, course timetable, etc.
5	**5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms. **You recognise the key relationships of energy conversion in the most commonly used turbo machinery. You also design impellers and volute casings from a fluidic perspective.**
6	**6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)* **None**
	6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation) **Students must pass the examination**
	6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes) **The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)**
	6.4 Requirements for admission to examination **See current version of the Examination Regulations / special examination rules and regulations** **Regular participation in the practical course and recognition of associated work**
	6.5 Module mark weighting for calculating final grade **See Examination Regulations for above-mentioned degree programmes (Section 3).*** *You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.
7	**7.1 Languages used in the module:** ☒ **German** ☐ **English** ☐ **Other, namely:**
	7.2 Module Contact Person: **Professor Dr.-Ing. H.-A. Jantzen**
	7.3 Professors (optional): **Professor Dr.-Ing. H.-A. Jantzen**
	7.4 Maximum number of participants (optional)
	7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.) ---

Advanced Mathematics

1	1.1 Title of module (GER / ENG) **Höhere Mathematik / Advanced Mathematics**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0024**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**1 (FT) / 1 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**1 (FT) / 1 (PT)**
	Mechanical Engineering - Specialisation Product Development	**C**	**1 (FT) / 1 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**4**	**60**	**180**	**6**
	Exercise	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **90**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**90**		
	Total		Total non-contact hours **90**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to perform coordinate transformations in finite-dimensional vector spaces. They will be able to represent linear operators using coordinate matrices, to implement corresponding diagonalisation methods, and to recognise the advantage of diagonalisable matrices in typical application cases and use them for problem-solving. They will also be able to decouple and solve linear differential equation systems using eigenvalues and eigenvectors. Students will be able to apply the connection of coordinate systems with multiple integrals and the foundations of integral theorems.

5.2 Course content

Linear algebra:

LU decomposition, abstract vector spaces, representation of coordinates, coordinate transformations, decomposition of ZAS, homomorphisms, equivalence transformation, endomorphisms, similarity transform, diagonalisation, Markov processes, decoupling of linear systems of equations

Analysis:

Nonlinear transformations, functional determinants, integral transformation, integral theorems, Fourier series, Fourier transform, applications

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Based upon the basic knowledge of various areas of mathematics in the bachelor program, this module deepens knowledge in some specific sub-areas of applied mathematics.

6 **6.1 Prerequisites** (*formal*: examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr. rer. nat. L. Göllmann

7.3 Professors (optional):

Professor Dr. rer. nat. L. Göllmann

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Recommended reading:

BARTSCH, H. J., Taschenbuch mathematischer Formeln. Fachbuchverlag Leipzig/Hanser
BRONSTEIN et al., Taschenbuch der Mathematik. Verlag Harri Deutsch
GÖLLMANN, L., Lineare Algebra – Im algebraischen Kontext, Springer Verlag
GÖLLMANN, L., Henig Ch., Arbeitsbuch zur Linearen Algebra, Springer Verlag
GÖLLMANN, L. et al., Mathematik für Ingenieure, Band 1 + 2, Springer Verlag
LABUCH, D., Aufgaben zur Linearen Algebra. B. G. Teubner Stuttgart Leipzig
PAPULA, L., Mathematik für Ingenieure und Naturwissenschaftler. Band 1 – 3, Vieweg
PAPULA, L., Mathematik für Ingenieure und Naturwissenschaftler - Übungen. Vieweg
PREUSS, W., Funktionaltransformationen. Mathematik-Studienhilfen. Fachbuchverlag Leipzig
TRÖLTZSCH, F., Optimale Steuerung partieller Differentialgleichungen. Vieweg

Advanced Technical Mechanics

1	1.1 Title of module (GER / ENG) **Höhere Technische Mechanik / Advanced Technical Mechanics**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0027**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**1 (FT) / 1 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development	**C**	**1 (FT) / 1 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to reproduce methods of analytical mechanics, i.e. advanced strength of materials in continuum, and to relate principles of mechanics, complementing their knowledge of classical mechanics. In addition, the analytical nature of the module will enable students to increase their capacity for abstract and lateral thinking by encouraging them to independently apply the specialist knowledge gained to technical problems. Students will be able to identify frequently occurring problems encountered in mechanics, and to calculate them using the solution methods they have learned. Besides being conversant with methods from the area of continuum mechanics and numerical mechanics, students who complete this module will be able to decide independently on the appropriate use of these methods.

5.2 Course content

- **Mechanical principles: The principle of virtual displacements, the principle of virtual forces, the Lagrangian version of d'Alembert's principle, Lagrangian equations of motion.**
- **Stability of mechanical systems (potential analysis)**
- **Advanced strength of materials: Material laws in continuum, Airy stress function**
- **Numerical methods: Approximation methods in mechanics (difference quotients and matrices, modal analysis)**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Building on classical mechanics, which you are familiar with, you now focus on methods of analytical mechanics. You identify frequently occurring problems from this field, and calculate solution variants using methods you have learned.

6 **6.1 Prerequisites** (*formal*: examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. J. Hartleb

7.3 Professors (optional):

Representation in WiSe 23/24: Prof. Dr.-Ing. habil. S. aus der Wiesche

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Agricultural Engineering 1

1	1.1 Title of module (GER / ENG) **Landmaschinentechnik 1 / Agricultural Engineering 1**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0037**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**1 (FT) / 3 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**3**

4 **Workload**

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to formulate the requirements regarding equipment and machinery with the intended use in mind, taking into account the different agronomic conditions and work objectives, and, on this basis, to substantiate the selection and settings of appropriate equipment and equipment combinations. They will be able to thoroughly assess the potential and application limits.
Thanks to their understanding of the structure and functioning of the equipment under consideration, students will be able to independently formulate suggestions for the further development and optimisation of machinery in their future career.

The practical courses enable students to expand on the basic and broader possibilities offered by

setting the equipment and machinery accordingly, using a selection of examples. In this way, their independent working style and their capacity for teamwork are actively promoted.

5.2 Course content

- **Agricultural soils and their properties**
- **Fundamentals of tractor engineering and connection of devices**
- **Precision farming, parallel guidance systems, basics of ISOBUS**
- **Machines for tillage**
- **Crop sequences and integrated plant cultivation**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

What requirements do agricultural equipment and machinery have to meet? You take a close look at the specific purposes, select adequate equipment and equipment combinations, and make task-specific adjustments.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. M. Große Gehling

7.3 Professors (optional):

Professor Dr.-Ing. M. Große Gehling

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Agricultural Engineering 2

1	1.1 Title of module (GER / ENG) **Landmaschinentechnik 2 / Agricultural Engineering 2**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0038**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**2 (FT) / 4 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**2**

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to formulate the requirements regarding equipment and machinery with the intended use in mind, taking into account the different agronomic conditions and work objectives, and, on this basis, to substantiate the selection and settings of appropriate equipment and equipment combinations. They will be able to thoroughly assess the potential and application limits.
Thanks to their understanding of the structure and functioning of the equipment under consideration, students will be able to independently formulate suggestions for the further development and optimisation of machinery in their future career.

The practical courses enable students to expand on the basic and broader possibilities offered by

setting the equipment and machinery accordingly, using a selection of examples. In this way, their independent working style and their capacity for teamwork are actively promoted.

5.2 Course content

- **Machinery for the production of cereals (drilling machines, field sprayers, self-propelled harvesters)**
- **Machinery for the production of maize and sugar beet (precision seed drills and forage harvesters)**
- **Fertilisation**
- **Selected chapters on tractor engineering**
- **Selected chapters on machinery for the production of potatoes**
- **Selected chapters on forage harvesting**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Building on the previous module "Agricultural Machinery Technology 1", you deepen your knowledge in this subject area until you are able to independently draw up proposals for the further development and optimisation of agricultural machinery.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. M. Große Gehling

7.3 Professors (optional):

Professor Dr.-Ing. M. Große Gehling

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Agricultural Process Technology

1	1.1 Title of module (GER / ENG) **Agrarverfahrenstechnik / Agricultural Process Technology**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0006**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**2 (FT) / 2 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**2**

4 **Workload**

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to describe, analyse and assess various unit operations of agricultural process engineering for post-harvesting processes such as drying, storage or milling. They will also be able to develop related processes in agricultural machines such as spraying and separating or in farm operation processes such as heat transfer or conveying. Students will be able to independently generate, analyse, assess and present experimental data. The topics of the module enable students to analyse and assess agricultural machines and processes from a different perspective to that of constructional mechanical engineering.
The practical courses enable students to understand the implementation and assessment of agricultural process engineering applications. To achieve this, selected unit operations are conducted

independently in small groups as experiments, including the relevant methods of analysis, which are evaluated and assessed by them, and presented in the form of a report. Compulsory attendance is required to achieve this goal.

5.2 Course content

- **Characterisation of disperse and fluid agricultural materials**
- **Processes for preparation and storage of agricultural products (purification, drying, milling, silo technology)**
- **Conveying of liquid and bulk solid materials**
- **Special processes in mobile and stationary agricultural applications**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Enginering processes like drying or storage have the same importance in agronomy like analytical methods for characterization of products, soils and crops. You assess and optimize appropriate processes and machines.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

Fundamentals of fluid dynamics and thermodynamics are required

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**
☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. J. Scholz

7.3 Professors (optional):

Professor Dr.-Ing. J. Scholz / Dipl.-Ing. M. Mangelmann

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Application of Numerical Software

1	1.1 Title of module (GER / ENG) **Anwendung Numerischer Software / Application of Numerical Software**		1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0009**
2	2.1 Cycle of module: ☒ Every summer semester ☐ Every winter semester Other cycle, namely:		2.2 Duration of module: ☒ 1 semester ☐ 2 semesters	
3	3.1 Module offered in the following degree programme(s):		3.2 Compulsory (C), compulsory elective (CE), elective (E)	3.3 Recommended semester:
	Master's programmes:			
	Mechanical Engineering - Specialisation Agricultural Engineering			
	Mechanical Engineering - Specialisation Computational Engineering		**C**	**2 (FT) / 4 (PT)**
	Mechanical Engineering - Specialisation Product Development			
	Master Business Administration & Engineering majoring in Mechanical Engineering		**CE**	**2**

4 Workload

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**2**	**30**	**180** **MaBA&E (210)**	**6** **MaBA&E (7)**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Catch-up of technical content **(MaBA&E only)**		**(30)**		
	Total		Total non-contact hours **105** **MaBA&E (135)**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to

- **Apply different methods for solving differential equation systems, classify those systems, and select an appropriate numerical solution method. Course participants will be able to assess each of the methods with regard to aspects such as stability. In addition, students will be able to plan the implementation of algorithms in a numerical software program, and develop the corresponding programs.**
- **Implement different methods for determining eigenvalues and eigenvectors. They will also be able to classify those methods, and to select an appropriate numerical solution method. Students will be able to assess each of the methods with regard to their numerical advantages. Moreover, students will be able to structure the implementation of the methods, and develop corresponding programs.**
- **Classify signal processing methods (acoustic signals and image signals), interpret important theorems such as the sampling theorem, and formulate the resulting hypotheses for signal filters. In addition, students will be able to develop small executable signal processing programs.**
- **Illustrate nonlinear optimisation methods with and without constraints. They will be able to formulate necessary and adequate optimality conditions, and to solve optimisation problems using numerical methods.**
- **Characterise methods for formulating optimal control processes, for discretisation and for setting relevant high-dimensional, nonlinear optimisation problems. They will be able to numerically treat discretised optimal control problems using powerful software packages, and to critically assess the solutions obtained.**

The individual processes and methods described above are implemented in executable computer programs in the practical course.

5.2 Course content

- **Runge–Kutta methods, step size control**
- **Implicit solvers, solvers for stiff differential equations**
- **Multistep methds and shooting methods**
- **Signal processing – numerical determination of eigenvalues and eigenvectors**
- **Creation of scripts and modules**
- **Nonlinear optimisation with constraints, Karush–Kuhn–Tucker conditions**
- **Optimisation of dynamic systems, discretisation of optimal control processes**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Numerical methods are the basis for the mathematical solution of complex mechanical problems. You plan the implementation of algorithms in a numerical software program, and develop small executable programs.

6 **6.1 Prerequisites** (*formal*: examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr. rer. nat. E. Finke, Professor Dr. rer. nat. L. Göllmann

7.3 Professors (optional):

Professor Dr. rer. nat. E. Finke, Professor Dr. rer. nat. L. Göllmann

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Automotive Engineering

1	1.1 Title of module (GER / ENG) **Fahrzeugtechnik / Automotive Engineering**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0013**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**CE**	**3 (FT) / 5 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**3**

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to discuss different vehicle designs, taking into account the relevant economic, legal and technical frameworks. They will be able to use the knowledge gained in their future career in order to understand the relevant vehicle design in terms of considering factors concerning cost, weight and structural properties, and to be able to develop and assess alternatives.

The practical courses provide students with an in-depth insight into the technical contexts, as well as specifically promoting their critical reflection of the results obtained, their independent work, and their capacity for teamwork.

5.2 Course content

- **Complete vehicle and overview of car body designs**
- **Wheels and tyres**
- **Chassis**
- **Driving performance and driving resistance**
- **Vehicle dynamics**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

You focus on the design of vehicles within economically, legally and technically specified framework conditions. You practise thinking in terms of alternatives and developing them.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. M. Große Gehling

7.3 Professors (optional):

Professor Dr.-Ing. M. Große Gehling

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Conveying Technology

1	1.1 Title of module (GER / ENG) **Fördertechnik / Conveying Technology**		1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0014**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**		2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):		3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:			
	Mechanical Engineering - Specialisation Agricultural Engineering		**CE**	**3 (FT) / 5 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering			
	Mechanical Engineering - Specialisation Product Development		**C**	**1 (FT) / 3 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		**CE**	**3**

4 **Workload**

				Total workload	
	Method of teaching	**Hours per week per semester (SWS) for each method of teaching**	**Hours per semester for each method of teaching** (usually the number of hours per week multiplied by 15)	**Workload in hours** Total contact and non-contact hours	**ECTS (credit points)** 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**2**	**30**	**180**	**6**
	Exercise	**2**	**30**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to develop appropriate materials handling equipment for conveying packaged and bulk goods. Students will be able to independently design the necessary documents for project planning, and to implement them following construction design and calculation. As a result, students will be able, in their future career, to initiate and accompany the development process of a materials handling plant.

The practical course enables students to develop and apply solution strategies for set tasks, building on the specialist knowledge gained during the lectures. By linking the content of the practical course to field trips to representative plants for handling packaged and bulk goods, students will be able to identify and express the industrial significance of the processes taught.

5.2 Course content

Movement analysis, foundations of drives, assemblies and elements of materials handling, calculation standards, handling properties of goods, continuous and intermittent handling equipment, interaction of different materials handling equipment

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

You develop appropriate conveyor systems to ensure that materials get to where they are needed. As a result, you will be able, in your future career, to initiate and accompany the development process of a materials-handling plant.

6 **6.1 Prerequisites** (*formal*: examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. J. Hartleb

7.3 Professors (optional):

Representation in WiSe 23/24

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Developments in Computer Science

1	**1.1 Title of module (GER / ENG)** **Developments in Computer Science**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.2.0012**
2	**2.1 Cycle of module:** ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	**2.2 Duration of module:** ☒ **1 semester** ☐ **2 semesters**	
3	**3.1 Module offered in the following degree programme(s):**	**3.2 Compulsory (C), compulsory elective (CE), elective (E)**	**3.3 Recommended semester:**
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**2 (FT) / 2 (PT)**
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**2**

4 **Workload**

				Total workload	
	Method of teaching	**Hours per week per semester (SWS) for each method of teaching**	**Hours per semester for each method of teaching** (usually the number of hours per week multiplied by 15)	**Workload in hours** Total contact and non-contact hours	**ECTS (credit points)** 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**2**	**30**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **60**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**120**		
	Total		Total non-contact hours **120**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to evaluate the latest developments in computer science. In addition, they will be able to describe the methods for evaluating computer systems, and to use these appropriately, particularly with respect to projects. They will also be able to evaluate the consequences of using new computing methods. By attending the integrated practical course and by writing a term paper, students learn how to develop and apply solution strategies to the set tasks, building on the specialist knowledge gained. This skill is further promoted by providing intensive support, owing to the up-to-dateness and complexity of the innovations in computer science addressed. In addition, besides acquiring the capability to procure information, students will practice the associated ability to transfer the knowledge to the relevant task. They will be able to formulate and present the results in a media-friendly format to suit the target group.

5.2 Course content

In groups of 2 to 4, students will address current issues of computer science and applications of computer science in the field of engineering.

Topics may come from the following areas:
Data acquisition
Data representation
Information backup
Information transmission
Information storage
Information processing

The topics addressed reflect progress made in computer science each year, and will change accordingly from year to year.

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

In small groups, you address current issues of computer science and their application in the field of engineering. Besides learning to procure information, you practise transferring your knowledge to relevant tasks.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

Presentation, video presentation

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☐ **German** ☒ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. M. Thiel

7.3 Professors (optional):

Professor Dr.-Ing. M. Thiel

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Drive Systems

1	1.1 Title of module (GER / ENG) **Antriebssysteme / Drive Systems**		1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0008**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**		2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):		3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:			
	Mechanical Engineering - Specialisation Agricultural Engineering		**C**	**1 (FT) / 1 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		**C**	**1 (FT) / 1 (PT)**
	Mechanical Engineering - Specialisation Product Development		**C**	**1 (FT) / 1 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering			

4 **Workload**

				Total workload	
	Method of teaching	**Hours per week per semester (SWS) for each method of teaching**	**Hours per semester for each method of teaching** (usually the number of hours per week multiplied by 15)	**Workload in hours** Total contact and non-contact hours	**ECTS (credit points)** 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**2**	**30**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **90**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**90**		
	Total		Total non-contact hours **90**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to select and design an appropriate drive system for mechanical engineering tasks. In the process, they will be able to recognise new technological developments (e.g. electric mobility) as well as the potential to minimise energy consumption and carbon emissions, and to transfer them to the selected system.

The practical course enables students to expand on and consolidate the specialist knowledge gained in the lectures by applying the knowledge to real systems. In particular, students will be able to conduct, evaluate and interpret series of measurements from a scientific perspective. In the process, the group work will enhance students' team, leadership and communication skills. By independently writing practical course reports, students will be able to prepare experimental results, as well as formulate and visualise the results in a media-friendly format to suit the target group.

5.2 Course content

Lecture:

- **Requirements applying to a drive system**
- **Criteria for the selection of drive technology**
- **Hydraulic drive systems: proportional and servo hydraulics, calculation of stationary and dynamic behaviour, application examples**
- **Electric drive systems: functional principles, construction, performance data, calculation of stationary and dynamic behaviour, application examples**
- **Drive/load coupling: direct drives, gearbox types, calculation methods**
- **Sensing devices for drive technology**
- **Controlled drive systems**
- **Energy efficiency of drive systems**

Exercise class:

- **Calculation and design of drive systems on the basis of application examples**

Practical course:

- **Independent group-based execution of experiments on drive systems**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

To get machinery and plants running, you select suitable drive systems or develop such systems yourself, using new technological developments (e.g. electromobility) and minimising energy consumption in the process.

6 **6.1 Prerequisites** (*formal*: examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. D. Scholz

7.3 Professors (optional):

Professor Dr.-Ing. D. Scholz

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Dynamics of Machines

1	1.1 Title of module (GER / ENG) **Maschinendynamik / Dynamics of Machines**		1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0042**	
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**		2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**		
3	3.1 Module offered in the following degree programme(s):		3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:	
	Master's programmes:				
	Mechanical Engineering - Specialisation Agricultural Engineering				
	Mechanical Engineering - Specialisation Computational Engineering				
	Mechanical Engineering - Specialisation Product Development		**C**	**2 (FT) / 2 (PT)**	
	Master Business Administration & Engineering majoring in Mechanical Engineering		**CE**	**2**	

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to define, assess and calculate dynamic effects in machines. They will learn how to professionally and methodologically analyse and specifically influence dynamically oriented mechanical processes in their future professional environment.

5.2 Course content

Foundations:

Representation of real machines on a calculation model (modelling), determination of parameters for the calculation model; dynamic systems with one or any number of degrees of freedom, with or without damping as

well as with any random external excitation; vibration measurement technology; nonlinear effects.

<u>Machine installation:</u>

Active and passive vibration isolation; foundations with shock load

<u>Rotor dynamics:</u>

Rigid and flexible rotors, critical rotational speeds, impact of gyroscopic effects, natural frequencies dependent on rotational speed, balancing technology

<u>Numerical methods</u> for frequency limits based on Dunkerley, Southwell, Rayleigh, etc.

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

You recognise dynamic effects in machines, and can assess and calculate them. This enables you to professionally and methodologically analyse and influence dynamically oriented mechanical processes in your future professional environment.

6 **6.1 Prerequisites** (*<u>formal</u>:* examination of module XY has to be passed or similar *<u>content-wise</u>; module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

To be able to understand the course, students require knowledge of the „Advanced Technical Mechanics“ module or a comparative module from the area of Analytical Mechanics.

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. J. Hartleb

7.3 Professors (optional):

Professor Dr.-Ing. J. Hartleb

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Fatigue Strength and Durability

1	**1.1 Title of module (GER / ENG)** **Betriebsfestigkeit /** **Fatigue Strength and Durability**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.2.0010**
2	**2.1 Cycle of module:** ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	**2.2 Duration of module:** ☒ **1 semester** ☐ **2 semesters**	
3	**3.1 Module offered in the following degree programme(s):**	**3.2 Compulsory (C), compulsory elective (CE), elective (E)**	**3.3 Recommended semester:**
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**CE**	**2 (FT) / 4 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**2**

4 **Workload**

				Total workload	
	Method of teaching	**Hours per week per semester (SWS) for each method of teaching**	**Hours per semester for each method of teaching** (usually the number of hours per week multiplied by 15)	**Workload in hours** Total contact and non-contact hours	**ECTS (credit points)** 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to analyse problems related to the fatigue strength of metallic materials and components. They will be able to assess the concepts and limitations of lifetime assessment, and select them accordingly. In their future professional careers, students will be able to discuss the possible causes of material fatigue, and to propose and assess technical solutions for lifetime improvement.

In the practical courses, students will address in depth specialist interconnections, and present them to suit the target group. In addition, students will practice working independently and as part of a team.

5.2 Course content

- **Fatigue of metallic materials and failure mechanisms**
- **Wöhler curve (S-N-curve) for materials and components, life characteristics**
- **Parameters and parameter functions of strength, statistical analysis**
- **Analysis of load-time functions, load collectives**
- **Factors influencing endurance limit**
- **Concepts for calculation of fatigue strength**
- **Determination of working loads of components and resulting stresses**
- **Estimation of fatigue strength of structural components**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Vibrations in metallic materials and components cause fatigue. You learn about concepts that can be used to estimate service life (and their limitations), and develop technical solutions for improvement.

6 **6.1 Prerequisites** (*formal*: examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. M. Große Gehling

7.3 Professors (optional):

Professor Dr.-Ing. M. Große Gehling

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Integrated Product Development

1	1.1 Title of module (GER / ENG) **Integrierte Produktentwicklung / Integrated Product Development**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0030**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development	**C**	**2 (FT) / 4 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**2**

4 **Workload**

				Total workload	
	Method of teaching	**Hours per week per semester (SWS) for each method of teaching**	**Hours per semester for each method of teaching** (usually the number of hours per week multiplied by 15)	**Workload in hours** Total contact and non-contact hours	**ECTS (credit points)** 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to express elements of the product creation process that are relevant to success. The individual aspects, see point 8, constitute the basis for high-quality design and development.

5.2 Course content

Planning, conception, design and elaboration as the fundamental building blocks of systematic product creation; methods of idea and innovation generation such as TRIZ and computer-aided invention;
Important elements of day-to-day design work such as patents, value analysis, product series, modular design, FMEA, QFD, risk management; process-oriented methods such as quality gates and simultaneous engineering; computer-aided design: CAx, PDM, PLM, CSCW; configuration management; virtualisation of product development; costs; quality

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

How are innovative product ideas developed? How are new products created? How are they designed? In this module, you learn the basic processes and tools required to systematically drive forward new developments.

6 **6.1 Prerequisites** (*formal*: examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Prof. Dr.-Ing. M. Brockmann

7.3 Professors (optional):

Prof. Dr.-Ing. M. Brockmann

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Knowledge Based Engineering

1	1.1 Title of module (GER / ENG) **Knowledge Based Engineering**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0031**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering	**CE**	**2 (FT) / 4 (PT)**
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**2**

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**2**	**30**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to recognised knowledge of components, assemblies and other documents in the development process. The determination of the resulting rules, dependencies and relationships provides the basis for designing formalised and therefore reusable knowledge. This knowledge is used in both CAD models and simulation models to create software modules. Consequently, students will apply the basic principle of knowledge-based engineering (KBE) in projects to reduce the time required to develop new products. These methods are an integral part of contemporary product development strategies, which can be used strategically.

Group-based project work will hone students' capacity for teamwork, forms of communication and conflict management. Students will be able to express the KBE development process, and formulate and present it to suit the target group.

5.2 Course content

Lecture/exercise class:

- **Foundations of virtual product development**
- **KBE in design**
- **CAD modelling techniques**
- **Knowledge-based design**
- **Engineering data management**
- **Knowledge management**
- **Knowledge-based engineering data management**

Practical course:

- **Use of the KBE method in design and simulation**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Reinventing the wheel is an unnecessary waste of resources, which is why you analyse components and assemblies for reusable knowledge. You use this knowledge in CAD and simulation models to reduce the development time for new products in projects.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. A. Komainda

7.3 Professors (optional):

Professor Dr.-Ing. A. Komainda

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Literature Study
Currently no offer for MaMB (full-time)

1	1.1 Title of module (GER / ENG) **Literatur-Hausarbeit / Literature Study**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0039**
2	2.1 Cycle of module: ☒ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**CE**	**2 or 3 (FT)/ 4 or 5 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**CE**	**2 or 3 (FT)/ 4 or 5 (PT)**
	Mechanical Engineering - Specialisation Product Development	**CE**	**2 or 3 (FT)/ 4 or 5 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)				**180**	**6**
	Total	Total contact hours in SWS	Total contact hours in hours		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	**Search, written elaboration**				
	Total		Total non-contact hours		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion, students will be able to independently search for and assess scientific literature for a given topic, and to present the findings from scientific perspectives, citing correctly. As a result, students will have the ability and skills required to undertake an interdisciplinary analysis of scientific literature.
The module content prepares students for the Master's thesis, a key element of which involves carrying out a systematic analysis of the literature. The professional use of literature, enabling access to a new task, is also a major advantage in day-to-day engineering.

5.2 Course content

- **Preparation of an overview of the relevant specialist literature and scientific publications on a particular set of issues**
- **Working out the fundamentals of scientific work and of the structure of scientific texts**
- **Establishment of a basis for searching for and assessing specialist literature**
- **Assessment of the investigated theories, concepts and solutions**

	Structuring and preparation of the insights gained and the conclusions drawn in the form of a seminar paper → Details available in the university calendar, course timetable, etc.
5	**5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms. **You practise producing scientific work by independently researching and evaluating specialist literature on a particular topic. You summarise your findings according to the rules of science (e.g. correct citation).**
6	**6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)* **None**
	6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation) **Students must pass the examination**
	6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes) **Written elaboration (main body of text usually 20-30 pages) covering at least 10 to 20 relevant and different academic sources, taking international sources into account**
	6.4 Requirements for admission to examination **See current version of the Examination Regulations / special examination rules and regulations**
	6.5 Module mark weighting for calculating final grade **See Examination Regulations for above-mentioned degree programmes (Section 3).*** *You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.
7	**7.1 Languages used in the module:** ☒ **German** ☐ **English** ☐ **Other, namely:**
	7.2 Module Contact Person: **Professor Dr.-Ing. H.-A. Jantzen, Professor Dr.-Ing. J. Scholz**
	7.3 Professors (optional): **---**
	7.4 Maximum number of participants (optional)
	7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.) **---**

Machine Tools

1	1.1 Title of module (GER / ENG) **Werkzeugmaschinen / Machine Tools**		1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0061**
2	2.1 Cycle of module: ☐ Every summer semester ☒ Every winter semester Other cycle, namely:		2.2 Duration of module: ☒ 1 semester ☐ 2 semesters	
3	3.1 Module offered in the following degree programme(s):		3.2 Compulsory (C), compulsory elective (CE), elective (E)	3.3 Recommended semester:
	Master's programmes:			
	Mechanical Engineering - Specialisation Agricultural Engineering			
	Mechanical Engineering - Specialisation Computational Engineering		**C**	**3 (FT) / 5 (PT)**
	Mechanical Engineering - Specialisation Product Development		**C**	**3 (FT) / 5 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		**CE**	**3**

4 **Workload**

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **90**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**90**		
	Total		Total non-contact hours **90**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

Students will be able to confidently design a machine tool with regard to the necessary static and dynamic rigidity. They will also have the experience to confidently assess the thermal, geometric and kinematic behaviour of a machine tool during the design process. Students will also be able to plan the right drive and feed design, and to undertake the optimal management and storage of machine tool components. The objective is to ensure that students will be able to meet the real-life demands of working life in the area of production processes.

The practical courses enable students to develop and apply solution strategies for the design of machine tools, building on the specialist knowledge gained in the lectures, and to formulate and present the results to suit the target group. To do this, students will expand on their practical experience, enabling them to implement the handling of the appropriate measuring technology for

modal analysis, for thermography, and for determining positioning accuracy using a laser interferometer. They will also be able to design a CNC program on a CNC turn-mill centre.

5.2 Course content

For one thing, students will identify the four main properties of machine tools, such as sufficient geometric and kinematic accuracy, and sufficient static, dynamic and thermal rigidity. For another, light will be shed on key aspects related to machine tools such as NC programming, main drives (synchronous and asynchronous motors), feed drives, guide tracks and spindle-bearing systems.
In the exercise classes, students will go over the main content again and carry out calculations accordingly. Laboratory class experiments involve small groups of students determining static and dynamic flexibility (including modal analysis), practised on models of machine tools, as well as trying out and evaluating the use of laser interferometers, thermal cameras and NC programs on machine tools.

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Building on your Bachelor's degree, you broaden your knowledge of manufacturing processes. By the end of the module, you will be able to design machine tools according to the specified properties and to select appropriate drive and feed concepts.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. H. Apmann

7.3 Professors (optional):

Professor Dr.-Ing. H. Apmann

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Recommended reading:
Manfred Weck, Christian Brecher: Werkzeugmaschinen Band 1-5 (the latest edition, in each case); Springer-Verlag
Beurteilung (6th edition); Springer-Verlag

Management Skills – Organisation and Leadership

1	1.1 Title of module (GER / ENG) **Managementkompetenz – Organisation und Führung / Management Skills – Organisation and Leadership**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0041**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**3 (FT) / 5 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**3 (FT) / 5 (PT)**
	Mechanical Engineering - Specialisation Product Development	**C**	**3 (FT) / 5 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to

- **Situationally analyse the social and methodological aspects of managerial tasks in a company.**
- **Analyse and correctly apply strategic instruments.**
- **Examine and assess strategic decisions in local, national and global markets.**
- **Formulate alternative strategies and systematically select appropriate alternative strategies.**
- **Orientate themselves in the various dimensions of managerial tasks, and differentiate their functions in the areas of leadership, communication, presentation, planning, analysis and reflection.**

- **Give speeches and presentations to suit the target group, and give and receive feedback.**

Systematically apply personal work practices.

5.2 Course content

This module covers the following aspects of management competence:

- **Basic concepts, the context and shaping of management**
- **Ideas of man, and leadership and organisation in companies in various periods**
- **Models for strategic corporate governance (e.g. stakeholder analysis)**
- **Market field strategies and portfolio planning as a key component of strategy formation**
- **Strategic significance of the formal and informal organisation**
- **Corporate culture as a soft factor of corporate governance with severe consequences**
- **Management of the product development process**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Using case studies, you learn – and then apply – the basics of management. You draw up a business plan for your own creative product, and then present it – the ideal opportunity to practise giving presentations to a target audience.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

Talk/presentation or term paper

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr. phil. F. Striewe

7.3 Professors (optional):

Professor Dr. phil. F. Striewe

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Material Flow Seminar

1	1.1 Title of module (GER / ENG) **Fördertechnisches Seminar / Material Flow Seminar**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0016**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development	**CE**	**2 (FT) / 4 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**2**

4 **Workload**

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**1**	**15**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **60**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**120**		
	Total		Total non-contact hours **120**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the seminar, students will be conversant with handling an industrial project from the broad field of material flow. By taking the initiative to cooperate with an industrial client, they will gain the skills required to communicate with people in the business community and will therefore prepare very intensively for their future professional practice. The module also teaches students the social and personal skills relevant in the professional context to successfully lead a project.

5.2 Course content

- **Introduction to a current problem by representatives of a company involved in materials handling or logistics activities**
- **Project generation on the basis of the presented problem**
- **Kick-off meeting**
- **Choice of a project leader / moderator; minutes**
- **Milestone planning**
- **Handling of the entire project according to plan, including**
  - **Feasibility study**
  - **Alternative concepts and solutions (morphological box)**
  - **Team discussions**
  - **Prototyping**
  - **Preparation and presentation of the results**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

You work independently on an industrial project from the broad spectrum of material flow. You independently organise a cooperative project with an industrial client and exchange ideas with people from the world of business.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

Presentation

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. J. Hartleb

7.3 Professors (optional):

Professor Dr.-Ing. J. Hartleb

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Modern Programming Concepts

1	1.1 Title of module (GER / ENG) **Moderne Konzepte der Programmierung / Modern Programming Concepts**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0044**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**2 (FT) / 2 (PT)**
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**2**	**30**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to design and implement individual software using advanced software development paradigms. They will also be able to develop applications on the basis of image processing algorithms. Knowledge of these algorithms will enable students to assess an important aspect of their later professional life, given that they represent a key industrial application area of computer science.

5.2 Course content

- **Software engineering, UML**
- **Design patterns**
- **Distributed applications**
- **Mobile computing**
- **Image processing**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Since image processing plays an important role in a digitalised industry, we focus on it in this module. You design and develop your own programs and applications on the basis of image processing algorithms.

6 **6.1 Prerequisites** (*formal*: examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Recognition of the related work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. S. Behr

7.3 Professors (optional):

Professor Dr.-Ing. S. Behr

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Set of slides used in the lecture

Multibody Simulation

1	1.1 Title of module (GER / ENG) **Mehrkörpersimulation / Multibody Simulation**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0043**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**1 (FT) / 1 (PT)**
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

				Total workload	
	Method of teaching	**Hours per week per semester (SWS) for each method of teaching**	**Hours per semester for each method of teaching** (usually the number of hours per week multiplied by 15)	**Workload in hours** Total contact and non-contact hours	**ECTS (credit points)** 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**2**	**30**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to analyse real multibody systems and determine the basic relations of kinematic chains. Expedient abstraction of the real-world system in joints and bodies represents an important element. To achieve this, students will be able to determine linkages, pivot points, masses, and moments of inertia, and to map them in a simulation tool. The corresponding representation of the simulation results will enable students to develop optimisation variants, and to assess and select optimal solutions. This fundamental knowledge in the area of multibody systems is essential for when students come to design mechanical systems in their professional environment.

The aim of the practical course is to enable students to transfer their theoretical knowledge to practical implementation in the form of computer-aided multibody simulations. Students will be able to handle a

specific simulation software program, and to develop and apply solution strategies to the set tasks. Group-based project work will hone students' capacity for teamwork, forms of communication and conflict management. Students will be able to describe, formulate and present to the relevant target group the development process of a dynamic multibody simulation.

5.2 Course content

Lecture/exercise class:

- **Coordinate systems**
- **Single body kinematics**
- **Mechanical systems with linkages**
- **Foundations of kinematic chains**
- **Single-loop kinematics**
- **Kinematics of multi-loop mechanisms**
- **Foundations of dynamics**
- **Computer-aided setup of equations of motion**

Practical course:

- **Dynamic simulation of technical systems using the MBS software program ADAMS**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

You analyse real multibody systems and determine the basic relations of kinematic chains. Using simulations, you develop optimisation variants, evaluate them, and choose the optimal solution.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. A. Komainda

7.3 Professors (optional):

Professor Dr.-Ing. A. Komainda

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Operations Research

1	1.1 Title of module (GER / ENG) **Operations Research**		1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0047**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**		2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):		3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:			
	Mechanical Engineering - Specialisation Agricultural Engineering			
	Mechanical Engineering - Specialisation Computational Engineering		**C**	**1 (FT) / 3 (PT)**
	Mechanical Engineering - Specialisation Product Development			
	Master Business Administration & Engineering majoring in Mechanical Engineering		**CE**	**3**

4 **Workload**

				Total workload	
	Method of teaching	**Hours per week per semester (SWS) for each method of teaching**	**Hours per semester for each method of teaching** (usually the number of hours per week multiplied by 15)	**Workload in hours** Total contact and non-contact hours	**ECTS (credit points)** 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to select current operations research methods, and to transfer and apply them to their own issues. These skills play an important role in the area of business management because economic decisions in companies are subordinated to a rational process. In addition, students will also be able to apply the decision algorithms learned to other issues of optimisation. Students will be able to discuss and assess the methods from the fields of applied mathematics, economics and computer science used in the module.
Students will specifically gain the following skills during lectures and the practical course:
Students will be able to…

- **… generate linear optimisation models, and to solve them using the simplex algorithm. In particular, students will be able to recognise and characterise special cases, and apply solution strategies. In addition, they will be able to transfer the simplex method to new issues.**
- **… present and assess decision criteria under uncertainty and under risk, and to select the "right one" for specific decision situations, enabling them to plan decision-making**

paths.

- **… describe important concepts of game theory, calculate different types of equilibrium, assess the importance of equilibria and derive options for action accordingly.**
- **… develop dynamic models and solve them using Bellman's principle of optimality.**
- **… select and apply graph theory algorithms, and to assess the results with regard to the question under analysis.**
- **… use nonlinear optimisation to analyse models, assess the results, and further develop existing algorithms.**
- **… illustrate and apply integer and combinatorial optimisation strategies, and to develop models that can be solved using these methods.**
- **… apply stochastic simulation methods, and to develop associated models.**
- **… select and confidently use software for the individual model types, and to assess the simulation results.**

The module's practical course enables students develop and apply solution strategies for the set tasks, building on the specialist knowledge gained in lectures, and to work in an interdisciplinary manner.

5.2 Course content

- **Linear optimisation: simplex algorithm, including special cases**
- **Decisions under uncertainty or risk**
- **Game theory: Nash equilibrium, normal form, Pareto efficiency, dominant strategies, mixed strategies, trembling hand perfection, dynamic games, extensive form games**
- **Graph theory: foundations, special graphs, isomorphism, matrix form, directed and valued graphs, shortest paths, minimum spanning tree, Eulerian and Hamiltonian graphs**
- **Dynamic optimisation: classification, Bellman's principle of optimality, recursive functional equation, storage**
- **Nonlinear optimisation: relegation methods, comparison with dynamic optimisation**
- **Integer and combinatorial optimisation**
- **Stochastic models, methods and simulations**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Complex and practical problems are analysed within the framework of a planning process. The real decision-making problem is represented by an optimisation or simulation model. With the help of the application of mathematical methods, a basis for the best possible decisions is created.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**
☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. J. Korn

7.3 Professors (optional):

Professor Dr.-Ing. J. Korn

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Recommended reading: lecture notes

Piston Engines

1	1.1 Title of module (GER / ENG) **Kolbenmaschinen / Piston Engines**		1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0032**
2	2.1 Cycle of module: ☒ Every summer semester ☐ Every winter semester Other cycle, namely:		2.2 Duration of module: ☒ 1 semester ☐ 2 semesters	
3	3.1 Module offered in the following degree programme(s):		3.2 Compulsory (C), compulsory elective (CE), elective (E)	3.3 Recommended semester:
	Master's programmes:			
	Mechanical Engineering - Specialisation Agricultural Engineering		**C**	**2 (FT) / 2 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		**C**	**2 (FT) / 2 (PT)**
	Mechanical Engineering - Specialisation Product Development			
	Master Business Administration & Engineering majoring in Mechanical Engineering		**CE**	**2**

4 **Workload**

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **90**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**90**		
	Total		Total non-contact hours **90**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to understand problems arising from the basics of reciprocating engines, and to transfer them to practical engineering applications. Students will be able to analyse and assess reciprocating engines (engines) and piston machines (pumps and compressors), as well as their use and technology. They will be able to describe and assess the design concepts, mechanisms of action and energy conversion processes in reciprocating engines. Students will also be able to solve special tasks related to the dynamics of reciprocating engines, including mass balancing.

The practical course enables students to transfer the specialist knowledge gained to tasks related to the experimental investigation of reciprocating engines. Working in small groups will promote students' communication skills and their ability to work in a team. By writing experiment evaluations,

students practice their solution-oriented thinking and the presentation of experiment results to suit the target group.

5.2 Course content

- **Concepts, classification and basics of reciprocating engines**
- **Machine dynamics of reciprocating engines and balancing conditions**
- **Reciprocating pumps: structure, mechanism of action, and design**
- **Reciprocating compressors: structure, mechanism of action, and design**
- **Reciprocating engines: structure and mechanism of action**
- **Turbocharging combustion engines**
- **Exhaust technology and the problem of exhaust gases**
- **Engine components**
- **Alternative drives and technological consequences**
- **Technical designs and design principles**
- **Practical experiments using engine test rigs**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

You explore flow phenonena and the conversion of the different kinds of energy in piston engines. You gain a basic understanding of thermodynamics and mechanics of reciprocating engines.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. habil. S. aus der Wiesche

7.3 Professors (optional):

Professor Dr.-Ing. habil. S. aus der Wiesche

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Plant Design

1	1.1 Title of module (GER / ENG) **Anlagenplanung / Plant Design**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0007**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering	**CE**	**2 (FT) / 4 (PT)**
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**2**

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **60**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**120**		
	Total		Total non-contact hours **120**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to interpret technical regulations concerning the dimensioning of components of energy and process engineering plants, and to independently implement and assess appropriate designs accordingly. They will be able to assess and develop individual apparatuses with regard to stability and design. Concerning the safety of plant components, students will be able to apply the key legal frameworks to the issue of plant design. With regard to the planning process, students will be able to implement and assess the main steps, from the idea and design of the plant to the cost estimate. The module content shows the close link between legal or external frameworks and the technical implementation of plant and apparatus, demonstrating a frequently occurring issue in engineering.

5.2 Course content

- **Structure and dimensioning of apparatus and apparatus components**
- **Special aspects of plant design (e.g. safety technology, legal frameworks, hygienic design, …)**
- **Systematic approach to plant design, from the idea and cost estimate to initial operation**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Plants and machines have to meet technical and legal requirements. You design plants considerng technical and economical aspects and assess their legal conformity.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. J. Scholz

7.3 Professors (optional):

Professor Dr.-Ing. J. Scholz

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Recommended reading:

W. Wagner: “Planung im Anlagenbau”, Vogel Fachbuch, 2nd edition, 2003
D. Gleich, R. Weyl: “Apparateelemente – Praxis der sicheren Auslegung”, Springer VDI Verlag, 2006
K. Sattler, W. Kasper: “Verfahrenstechnische Anlagen – Planung, Bau, Betrieb”, Wiley-VCH Verlag, 2000
H.G. Hirschberg: “Handbuch Verfahrenstechnik und Anlagenbau”, Springer Verlag, 1999
Lecture notes

Polymer Engineering

1	1.1 Title of module (GER / ENG) **Konstruieren mit Kunststoffen / Polymer Engineering**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0036**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development	**CE**	**2(FT) / 4 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**2**

4 Workload

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Total		Total non-contact hours **105**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to identify the engineering polymers used, as well as reproduce their properties and the key production processes. They will be able to inspect material properties and use them to specifically select methods, taking into account economic aspects. Supported by the practical class, students will apply typical functional elements to learn how to use polymer-specific dimensioning methods for material-, production-, load- and practice-oriented component design, and how to apply relevant methods of calculation.

5.2 Course content

- **Structure of polymers**
- **Properties and design parameters**
- **Production processes for polymer parts**
- **Production impacts on material properties and component design**
- **Design and dimensioning of polymer parts**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

What are special properties of polymer materials and how can they be used in technical appliations? You learn about structures of polymers and component design and dimensioning of polymer parts.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise; module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Dr.-Ing. M. Laubrock

7.3 Professors (optional):

Dr.-Ing. M. Laubrock

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Renewable Resources

1	1.1 Title of module (GER / ENG) **Nachwachsende Rohstoffe / Renewable Resources**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0045**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**3 (FT) / 5 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**3**

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180** **MaBA&E (210)**	**6** **MaBA&E (7)**
	Exercise	**1**	**15**		
	Practical course	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Catch-up of technical content **(MaBA&E only)**		**(30)**		
	Total		Total non-contact hours **105** **MaBA&E (135)**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion, students will be able to analyse and assess technical processes associated with the use of renewable resources and in the provision of bioenergy. Alongside technical assessment, aspects of sustainability also play a role. Students will be able to analyse the possibilities for material use of renewable resources, and to assess the processes accordingly. They will also be able to assess selected ecological impacts of using renewable resources.
Being able to analyse and assess processes for using renewable resources and

bioenergy is an important basis for discussions concerning climate change and sustainability.

The practical courses enable students to understand the implementation and assessment of processes for converting and using renewable resources. To achieve this, selected processes are conducted independently in small groups as experiments, including the relevant methods of analysis, evaluated and assessed by them, and presented in the form of a report.

5.2 Course content

- **Technical fundamentals of the processes for energy use of renewable resources (e.g. wood, biogas, biofuel)**
- **Possibilities for material use of renewable resources**
- **Ecological and social aspects of using renewable resources**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Which role can renewable resources play in energy supply? You analyze processes for allocation of bioenergy as well as material use of renewable resources and assess their sustainability.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

To be able to understand the course, students require basic knowledge of fluid mechanics and thermodynamics

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**
☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. J. Scholz

7.3 Professors (optional):

Professor Dr.-Ing. J. Scholz / Dipl.-Ing. M. Mangelmann

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Recommended reading:
M. Kaltschmitt, H. Hartmann: "Energie aus Biomasse – Grundlagen, Techniken und Verfahren", Springer Verlag, 2001
W. Diepenbrock: "Nachwachsende Rohstoffe", Ulmer Verlag, 2014
Lecture notes and documentation relating to the practical course

Robotics

1	1.1 Title of module (GER / ENG) **Robotertechnik / Robotics**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0057**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**1 (FT) / 3 (PT)**
	Mechanical Engineering - Specialisation Product Development		
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**2**	**30**	**180** **MaBA&E (210)**	**6** **MaBA&E (7)**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Catch-up of technical content **(MaBA&E only)**		**(30)**		
	Total		Total non-contact hours **105** **MaBA&E (135)**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to evaluate and design appropriate robotic systems in a practice-oriented manner on the basis of mathematical robotics basics, and to adapt them for specific issues.

The practical course and the integrated project practical enable students to develop and apply solution strategies for the set tasks that build on the specialist knowledge gained in the lectures. Besides acquiring the capability to procure information,

students will practice the associated ability to transfer the knowledge to the relevant issue. They will also be able to formulate and present the results to suit the target group.

5.2 Course content

Lecture:

Basic types and designs of robots, articulated robots, mobile robots, industrial robots, robot kinematics, drives and sensors, motion control, detection/avoidance of unwanted movements, robot control, programming robotic systems, offline programming tools, communication via handheld terminals, tools and interfaces, modelling the robot environment, simulation of robotic systems, online continuous path control

Exercise class:

Calculation of the motion dynamics of robots, calculation of cycle times, coordinate transformations, robot programming, simulations

Project practical:

On the basis of the above or a task of their own choice from the field of robotics, students are expected to tackle part of an area independently and in depth, and prepare, document and present the findings conceptually with the task in mind. During face-to-face classes, students will be introduced to robot programming and robot simulation.

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

After studying the theory of robot programming, you work in groups on modern industrial robots. You implement a variety of tasks in a simulation program, and then transfer them to a real robot.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. S. Behr, Professor Dr.-Ing. A. Komainda

7.3 Professors (optional):

Professor Dr.-Ing. S. Behr, Professor Dr.-Ing. A. Komainda

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Recommended reading:

Siciliano, Khatib: Springer Handbook of Robotics, Springer, Berlin, Heidelberg, 2nd edition, 2008

Science & Fiction

1	1.1 Title of module (GER / ENG) **Science & Fiction**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0066**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**CE**	**2 (FT) / 4 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**CE**	**2 (FT) / 4 (PT)**
	Mechanical Engineering - Specialisation Product Development	**CE**	**2 (FT) / 4 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Seminaristic Lecture with case studies	**2**	**30**	**180**	**6**
	Exercise				
	Practical course				
	Total	Total contact hours in SWS	Total contact hours in hours **30**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**150**		
	Total		Total non-contact hours **150**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

5.2 Course content

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular participation in the practical course and recognition of associated work

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Prof. Dr.-Ing. Samir Salameh, Prof. Dr.-Ing. Jürgen Scholz

7.3 Professors (optional):

Prof. Dr.-Ing. Samir Salameh, Prof. Dr.-Ing. Jürgen Scholz

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Technology of Mechanisms (Tribology)

1	1.1 Title of module (GER / ENG) **Getriebetechnik / Technology of Mechanisms**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0019**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering		
	Mechanical Engineering - Specialisation Computational Engineering		
	Mechanical Engineering - Specialisation Product Development	**CE**	**3 (FT) / 5 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**3**

4 **Workload**

				Total workload	
	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Workload in hours Total contact and non-contact hours	ECTS (credit points) 30 hrs usually correspond to 1 credit point; whole numbers only
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180** **MaBA&E (210)**	**6** **MaBA&E (7)**
	Exercise	**2**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **75**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**105**		
	Catch-up of technical content **(MaBA&E only)**		**(30)**		
	Total		Total non-contact hours **105** **MaBA&E (135)**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to apply the basic knowledge of friction, wear and lubrication and assess the mechanisms of action required to reduce wear and optimize friction. In addition, they will be able to carry out a functional, economic and ecological optimization of motion systems.

5.2 Course content

- **System properties**
- **Friction**
- **Wear and tear**
- **Lubrication Technology**
- **Surface and measurement technology**
- **Tribometry**
- **Failure analysis of tribological systems**

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

Many machines have transmissions. You classify different types of transmissions and determine their relevant parameters. Equipped with this knowledge, you can design your own transmissions and select appropriate ones for different applications.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. C. Spura

7.3 Professors (optional):

Professor Dr.-Ing. C. Spura

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

The German Legal System and Product Liability

1	1.1 Title of module (GER / ENG) **Recht und Produkthaftung /** **The German Legal System and Product Liability**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0055**
2	2.1 Cycle of module: ☐ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**3 (FT) / 3 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**3 (FT) / 3 (PT)**
	Mechanical Engineering - Specialisation Product Development	**C**	**3 (FT) / 3 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)	Lecture	**3**	**45**	**180**	**6**
	Exercise	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **60**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**120**		
	Total		Total non-contact hours **120**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion of the module, students will be able to apply legally complex matters to concrete situations in their future professional and private life. In particular, students will be able to deal with contracts, draw up contracts, and analyse and interpret them. They will also be able to come to grips with contracts containing material or legal defects, since they will be able to transfer specific terms from legislation related to default in performance. In addition, they will be able to point out terms and interrelations from contracts for work and services in general and, in the special part, also from product liability. Students will also be able to cite and illustrate general and special law of obligations, as well as enrichment and tort. In addition, they will be able to recognise recurring problems arising from the German Commercial Code (HGB), and to deal with them using argumentation. The specialist knowledge gained will help students to be able to analyse, assess and

solve semi-realistic issues and case scenarios, also with regard to challenges in their later everyday engineering life.

5.2 Course content

Structure of the German legal system; distinction between the areas of law; typification of norms, laws and rules of law; foundations of the German Civil Code (BGB); the structure of the BGB; the books of the BGB; legal entities of civil law; legal capacity; capacity to contract; declaration of intent; contract; foundations of contract law; representation; material defects; defects of title; contract of sale; absence of intent; contract for services; public sector employment contract; product liability and producers' liability: contractual reasoning; tortious reasoning (duty to design and warn, product monitoring obligation, liability in the case of ineffective products, onus of proof); product liability

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

You may encounter contracts or product liability cases in your professional life. This module prepares you for these tasks. You acquire the necessary knowledge and apply it to various situations on the basis of case studies.

6 **6.1 Prerequisites** (*formal*: examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

The module is regularly completed with a written exam (1.5 - 3 hours), an oral exam (20 - 45 minutes) or a term paper (approx. 10 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Dean Professor Dr. rer. nat. E. Finke

7.3 Professors (optional):

Lecturer Solicitor C. Ihm

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Master’s – description of practical modules

Project Report

1	1.1 Title of module (GER / ENG) **Projektarbeit (Master) / Project Report**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0049**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**2 (FT) / 2 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**2 (FT) / 2 (PT)**
	Mechanical Engineering - Specialisation Product Development	**C**	**2 (FT) / 2 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering	**C**	**4**

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)				**180**	**6**
	Total	Total contact hours in SWS	Total contact hours in hours		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**180**		
	Total		Total non-contact hours **180**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion, students will be able to independently tackle a scientific or practice-based assignment within the time allowed, using cross-module approaches and therefore applying the basics and skills acquired thus far on the programme, and transferring them to the given problem. One key aspect is the ability to contribute as part of a team such that the team succeeds in achieving the set assignment. Another aim is for students to comprehensibly document, plausibly present, and explain the approaches, the path taken, and the results of the solution to the problem.
The module content prepares students for the scientific project and the Master's thesis, which also involve tackling an engineering or scientific assignment, and documenting and presenting the results.
The module is of great practical relevance for professional life as an engineer, given that project execution in a team is a core task and engineers must be able to document and present technical issues with confidence.

5.2 Course content

Cross-module assignment from the subject areas of the degree programme.
Final presentation in the presence of the supervisor(s).

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

As part of a project team, you work on a scientific assignment or a practice-oriented task. You summarise your results in a term paper and hold a presentation.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

None

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

Written elaboration by the examination candidate (main body of text usually 10-15 pages); presentation followed by questions, lasting a maximum of 30 minutes per examination candidate.

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. H.-A. Jantzen, Professor Dr.-Ing. J. Scholz

7.3 Professors (optional):

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Scientific Project

1	1.1 Title of module (GER / ENG) **Wissenschaftliches Projekt / Scientific Project**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0062**
2	2.1 Cycle of module: ☒ **Every summer semester** ☒ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**3 (FT) / 4 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**3 (FT) / 4 (PT)**
	Mechanical Engineering - Specialisation Product Development	**C**	**3 (FT) / 4 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering		

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)				**180**	**6**
	Total	Total contact hours in SWS	Total contact hours in hours		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**180**		
	Total		Total non-contact hours **180**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful completion, students will be able to independently tackle a scientific assignment within the time allowed, using cross-module approaches and therefore applying the basics and skills acquired thus far on the programme, and transferring them to the given problem. One key aspect is to complete the task on the basis of producing scientific work, encompassing not only a systematic analysis of the literature, but also a critical discussion of the results. Another aim is for students to comprehensibly document and plausibly explain the approaches, the path taken, and the results of the solution to the problem, and to present and discuss the findings before a specialist audience.
The module content builds on the project work and prepares students for the Master's thesis, which also involves tackling an engineering or scientific assignment, and documenting and presenting the results.
The module is of great practical relevance for professional life as an engineer, given that project execution is a core task and engineers must be able to document and confidently present technical

issues.

Preparatory work for the scientific project should be undertaken at the university, but may also be performed at a company.

5.2 Course content

A scientifically oriented question from the subject area of the degree programme

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

The project involves independently tackling a scientific task. You summarise your results in a term paper and hold a presentation about your work.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise; module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

See current version of the Examination Regulations / special examination rules and regulations

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

Written elaboration (main body of text usually 10-15 pages) and a presentation followed by a discussion/questions, lasting a maximum of 30 minutes

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. H.-A. Jantzen, Professor Dr.-Ing. J. Scholz

7.3 Professors (optional):

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Master's Thesis

1	1.1 Title of module (GER / ENG) **Masterarbeit / Master's Thesis**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.2.0001 - MB.2.0004**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**4 (FT) / 6 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**4 (FT) / 6 (PT)**
	Mechanical Engineering - Specialisation Product Development	**C**	**4 (FT) / 6 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering	**C**	**4**

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)				**750**	**25**
	Total	Total contact hours in SWS	Total contact hours in hours		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**750**		
	Total		Total non-contact hours **750**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

After successful preparation, students will be able to independently tackle a scientific question from the subject area of mechanical engineering, both as regards technical details and interdisciplinary contexts, within a set time. Students will be able to structure the problem and plan how to tackle it. They will be able to assess their results in the light of scientific literature, and to draw conclusions accordingly. Students will be able to present the approach, the results and the ensuing critical analysis in a structured manner in a written text.

The skills gained whilst completing the Master's thesis prepare students for a career in industry or for a doctorate.

5.2 Course content

Scientifically oriented task from the subject area of the degree programme. Students may complete their Master's thesis in an external establishment such as a company or a research institution, or at the university. This is made easier by the numerous research projects undertaken at FH Münster.

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

By completing a Master's thesis, you demonstrate your ability to apply the knowledge gained during the degree programme to current engineering and practice-oriented tasks from the subject area of your programme.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

See current version of the Examination Regulations / special examination rules and regulations

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

Written elaboration (main body of text approx. 30-120 pages)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. H.-A. Jantzen, Professor Dr.-Ing. J. Scholz

7.3 Professors (optional):

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)

Colloquium

1	1.1 Title of module (GER / ENG)	1.2 Short description (optional)	1.3 Module code (from HIO)
	Kolloquium / Colloquium		**MB.2.0033 - MB.2.0035**
2	2.1 Cycle of module: ☒ **Every summer semester** ☐ **Every winter semester** **Other cycle, namely:**	2.2 Duration of module: ☒ **1 semester** ☐ **2 semesters**	
3	3.1 Module offered in the following degree programme(s):	3.2 Compulsory **(C)**, compulsory elective **(CE)**, elective **(E)**	3.3 Recommended semester:
	Master's programmes:		
	Mechanical Engineering - Specialisation Agricultural Engineering	**C**	**4 (FT) / 6 (PT)**
	Mechanical Engineering - Specialisation Computational Engineering	**C**	**4 (FT) / 6 (PT)**
	Mechanical Engineering - Specialisation Product Development	**C**	**4 (FT) / 6 (PT)**
	Master Business Administration & Engineering majoring in Mechanical Engineering	**C**	**4**

4 **Workload**

	Method of teaching	Hours per week per semester (SWS) for each method of teaching	Hours per semester for each method of teaching (usually the number of hours per week multiplied by 15)	Total workload: Workload in hours (Total contact and non-contact hours)	Total workload: ECTS (credit points) (30 hrs usually correspond to 1 credit point; whole numbers only)
Contact hours (e.g. lecture, seminar, practical course, practical period/internship, group work, project work, case study, simulation game, credited tutorial (more rows can be added)				**150**	**5**
	Total	Total contact hours in SWS	Total contact hours in hours		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation for assignments, follow-up work, preparation for examination		**150**		
	Total		Total non-contact hours **150**		

5 **5.1 Intended learning outcomes** (What should students be able to do after having completed the module? Does the module provide the opportunity to acquire soft skills in addition to technical skills? For which other modules and prospective tasks in the labour market are the acquired knowledge and skills relevant?)

In the colloquium, students demonstrate their ability to present, orally explain and independently substantiate before a specialist audience the results of their Master's thesis, its specialist and methodological basis, interdisciplinary contexts and wider references. Students also show that they are able to assess the significance of their findings for practice or science. In particular, students will hone their presentation and argumentation skills.

5.2 Course content

Based on the results of the Master's thesis

→ Details available in the university calendar, course timetable, etc.

5 **5.3 Short information about module** (This section [max. 250 characters] will be published on the FH Münster website to help people interested in studying at FH Münster to choose the right degree. Please focus on the main intended learning outcomes and course content, ideally also comprising information about the relevance of the module for the further course of study and the labour market. Please write whole sentences, address your (prospective) students directly and avoid technical terms.

During the colloquium, you present the key aspects of your Master's thesis to a specialist audience. You show that you can orally explain and argue the objectives, and the practical and scientific relevance of your final thesis.

6 **6.1 Prerequisites** (*formal:* examination of module XY has to be passed or similar *content-wise*; *module XY should have been attended, the following knowledge and skills should have been acquired: ….)*

See current version of the Examination Regulations / special examination rules and regulations

6.2 Requirements for awarding credit points (e.g. final examination pass, successful completion of assignments in the course of study, regular active participation)

Students must pass the examination

6.3 Type and scope of examination (e.g. written examination, oral examination, term paper, presentation, portfolio, length of examination in minutes)

Presentation followed by an oral examination, with a total duration of around 30 minutes

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations

6.5 Module mark weighting for calculating final grade

See Examination Regulations for above-mentioned degree programmes (Section 3).*

*You will find the Examination Regulations of all degree programmes in the official announcements of FH Münster: https://www.fh-muenster.de/hochschule/aktuelles/amtliche_bekanntmachungen/index.php?p=2,7.

7 **7.1 Languages used in the module:**

☒ **German** ☐ **English** ☐ **Other, namely:**

7.2 Module Contact Person:

Professor Dr.-Ing. H.-A. Jantzen, Professor Dr.-Ing. J. Scholz

7.3 Professors (optional):

7.4 Maximum number of participants (optional)

7.5 Further information (optional) (e.g. recommended reading, other persons involved, etc.)
