FH MÜNSTER
University of Applied Sciences

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

Department of Mechanical Engineering

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Inhalt

Course timetables for Bachelor's degree programmes

Degree programmes and specialisations	Valid from enrolment in
Bachelor International Engineering – Mechanical Engineering	WiSe 21 / 22
Bachelor Mechanical Engineering	WiSe 21 / 22
Bachelor Mechanical Engineering, Specialisation in Construction and Manufacturing Technology	
Bachelor Mechanical Engineering, Specialisation in Plant Engineering	
Bachelor Mechanical Engineering, Specialisation in Automotive and Drive Engineering	
Bachelor Computer Science in Mechanical Engineering	WiSe 21 / 22
Bachelor Business Administration & Engineering majoring in Mechanical Engineering	WiSe 21 / 22
Bachelor Mechanical Engineering - Dual	WiSe 21 / 22

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
ET = examination type
SuSe = summer semester
WiSe = winter semester
GS = guest semester

L = lecture
S = seminar
SL = seminaristic lecture
E = exercise (exercise class)
P = practical course (laboratory class)

Bachelor International Engineering – Mechanical Engineering (Outgoings FH Münster)

Compulsory engineering modules

Practical modules

Modules at Partner University

Practical modules at Partner University

1st - 7th Semester Bachelor International Engineering - Mechanical Engineering (Outgoings)

1st sem.	Mathematics 1	Physics	Statics	Basics of Construction Design	Materials Engineering 1	
2nd sem.	Mathematics 2 / Statistics	Machine Elements	Strength of Materials	Basics of Construction Design	Programming Basics	Materials Engineering 2
3rd sem.	Introduction to Electrical Engineering	Thermodynamics	Fluid Mechanics	Design Engineering / CAD 1	Basics of Business Administration	Spanish for Engineering and Latin American Culture 1
4th sem.	Dynamics	Production Engineering 1	Introduction to Finite Element Method	Design Engineering / CAD 2	Hydraulics	Spanish for Engineering and Latin American Culture 2
5th sem.	Study in Latin America at Partner University (UPB / USACH)					
6th sem.	Study in Latin America at Partner University (UPB / USACH)					
7th sem.	Study in Latin America at Partner University (UPB / USACH)	Practical Project (UPB)	Bachelor Thesis (UPB / USACH)	Colloquium (UPB)		

- Outgoings (FH Münster) 1st – 4th Semester

Abbreviations:

HWS = Hours per Week per Semester	L = Lecture	ET = Examination Type
CP = Credit Points	SL = Seminaristic Lecture	SE = Standard Examination
	E = Excercise Class	UT = Unit Test
	S = Seminar	PT 1 = Part 1 of the Unit Test
	P = Laboratory Class	PT 2 = Part 2 of the Unit Test

Studies in Münster	**1st Semester**							**2nd Semester**							**3rd Semester**							**4th Semester**							**5th - 7th Semester**							**Total**	
	HWS					CP	ET	HWS					CP	ET	HWS					CP	ET	HWS					CP	ET	HWS					CP	ET		
Type of Course	L	S	P	E	SL			L	S	P	E	SL			L	S	P	E	SL			L	S	P	E	SL			L	S	P	E	SL			**HWS**	**CP**
Modules at FH Münster																																					
Mathematics 1	4	0	0	2	0	8	UT																													**6**	**8**
Statics	2	0	0	2	0	5	UT																													**4**	**5**
Physics	3	0	0	2	0	6	UT																													**5**	**6**
Materials Engineering 1	2	0	1	1	0	5	UT																													**4**	**5**
Basics of Construction Design	2	0	2	0	0	6		0	0	2	0	0	3	UT																						**6**	**9**
Mathematics 2 / Statistics								6	0	0	3	0	7	UT																						**9**	**7**
Strength of Materials								2	0	0	2	0	5	UT																						**4**	**5**
Machine Elements								3	0	0	1	0	5	UT																						**4**	**5**
Materials Engineering 2								3	0	1	0	0	5	UT																						**4**	**5**
Programming Basics								3	0	1	1	0	5	UT																						**5**	**5**
Introduction to Electrical Engineering															3	0	1	1	0	5	UT														**5**	**5**
Thermodynamics															3	0	0	1	0	5	UT														**4**	**5**
Fluid Mechanics															3	0	1	1	0	5	UT														**5**	**5**
Design Engineering / CAD 1															2	0	2	1	0	5	UT														**5**	**5**
Basics of Business Administration															2	0	0	2	0	5	UT														**4**	**5**
Spanish for Engineering and Latin American Culture 1															0	0	0	2	2	5	UT														**4**	**5**
Spanish for Engineering and Latin American Culture 2																						0	0	0	2	2	5	UT							**4**	**5**
Dynamics																						2	0	0	2	0	5	UT							**4**	**5**
Production Engineering 1																						2	0	1	1	0	5	UT							**4**	**5**
Introduction to Finite Element Methods																						3	0	1	1	0	5	UT							**5**	**5**
Design Engineering / CAD 2																						0	0	2	1	0	5	UT							**3**	**5**
Hydraulics																						2	0	1	1	0	5	UT							**4**	**5**
Modules at Partner University																																					
Modules, incl. Internship (UPB) Bachelor Thesis (UPB / USACH) Colloquium (UPB)																																		90	MP	**0**	**90**
TOTAL	*13*	*0*	*3*	*7*	*0*	*30*	*0*	*17*	*0*	*4*	*7*	*0*	*30*	*0*	*13*	*0*	*4*	*8*	*2*	*30*	*0*	*9*	*0*	*5*	*8*	*2*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*90*	*0*	***102***	***210***
	23							*28*							*27*							*24*							*0*								

- Outgoings (UPB) 5th – 7th Semester

Abbreviations:

HWS = Hours per Week per Semester	L = Lecture	ET = Examination Type
CP = Credit Points	SL = Seminaristic Lecture	SE = Standard Examination
	E = Excercise Class	UT = Unit Test
	S = Seminar	PT 1 = Part 1 of the Unit Test
	P = Laboratory Class	PT 2 = Part 2 of the Unit Test

Studies in Medellín	**1st - 4th Semester**							**5th Semester**							**6th Semester**							**7th Semester**							**Total**		
	HWS							HWS							HWS							HWS									
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CCP	ET	L	S	P	E	SL	CCP	ET	L	S	P	E	SL	CCP	ET	**HWS**	**CP**	**CCP**
Modules at FH Münster																															
Modules in total						120																							**-**	**120**	**-**
Modules at UPB																															
Mechanical Design								2	0	0	2	0	3	SE															**4**	**-**	**3**
Project Management								3	0	0	1	0	3	SE															**4**	**-**	**3**
Maintainance Management								3	0	0	1	0	3	SE															**4**	**-**	**3**
Materials Selection								3	0	0	1	0	2	SE															**4**	**-**	**2**
Thermal and Hydraulic Machines								3	0	0	1	0	2	SE															**4**	**-**	**2**
Laboratory Thermal and Hydraulic Machines								0	0	2	0	0	1	SE															**2**	**-**	**1**
Professional optative 1								X	X	X	X	X	3	SE															**-**	**-**	**3**
Elective Humanistic Education Course 2															4	0	0	0	0	2	SE								**4**	**-**	**2**
Professional Context															2	0	0	0	0	1	SE								**2**	**-**	**1**
Industrial Management															3	0	0	1	0	3	SE								**4**	**-**	**3**
Control Engineering															3	0	0	1	0	2	SE								**4**	**-**	**2**
Laboratory Control Engineering															0	0	2	0	0	1	SE								**2**	**-**	**1**
Research Methodology															2	0	0	0	0	1	SE								**2**	**-**	**1**
Applied Engineering Subject 4															0	0	0	4	0	3	SE								**4**	**-**	**3**
Professional optative 2															X	X	X	X	X	3	SE								**-**	**-**	**3**
Elective																						X	X	X	X	X	3	SE	**-**	**-**	**3**
Professional Practice (incl. Internship, Bachelor Thesis and Kolloquium)																						X	X	X	X	X	11	SE	**-**	**-**	**11**
TOTAL																														***90****	***47****
(* The CCPs earned at UPB will be recognized as 90 CPs at FH Münster)	*0*	*0*	*0*	*0*	*0*	*120*	*0*	*14*	*0*	*2*	*6*	*0*	*17*	*0*	*14*	*0*	*2*	*6*	*0*	*16*	*0*	*0*	*0*	*0*	*0*	*0*	*14*	*0*	***44***	***210***	
	0							*22*							*22*							*0*									

- Outgoings (USACH) 5th – 7th Semester

Abbreviations:

HWS = Hours per Week per Semester	L = Lecture	ET = Examination Type
CP = Credit Points	SL = Seminaristic Lecture	SE = Standard Examination
	E = Excercise Class	UT = Unit Test
	S = Seminar	PT 1 = Part 1 of the Unit Test
	P = Laboratory Class	PT 2 = Part 2 of the Unit Test

Studies in Santiago de Chile	**1st - 4th Semester**							**5th Semester**							**6th Semester**							**7th Semester**							**Total**	
	HWS							HWS							HWS							HWS								
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	**HWS**	**CP**
Modules at FH Münster																														
Modules in total						120																							**0**	**120**
Modules at USACH																														
Thermical and Hydraulic Systems								6	0	2	2	0	8	UT															**10**	**8**
Manufacturing Processes 2								4	0	2	0	0	5	UT															**6**	**5**
Heat Transmission								4	0	1	2	0	5	UT															**7**	**5**
Motors and Machines								4	0	1	0	0	5	UT															**5**	**5**
Maintainance Procedures								4	0	0	0	0	4	UT															**4**	**4**
Finance and Microeconomics								4	0	0	0	0	3	UT															**4**	**3**
Machines with Numerical Control															2	0	2	0	0	5	UT								**4**	**5**
Automatization															4	0	1	0	0	4	UT								**5**	**4**
Applicated Computer Sciences															2	0	2	0	0	4	UT								**4**	**4**
Elective															4	0	2	0	0	5	UT								**6**	**5**
Market Investigation															4	0	2	0	0	5	UT								**6**	**5**
Business Administration and Entrepreneurship															2	0	0	2	0	2	UT								**4**	**2**
Thesis Preparation															2	0	2	0	0	5	UT								**4**	**5**
Energy and Environment																						4	0	1	0	0	4	UT	**5**	**4**
Production Planning and Control																						2	0	2	0	0	4	UT	**4**	**4**
Thesis																						0	0	2	0	0	22		**2**	**22**
TOTAL	*0*	*0*	*0*	*0*	*0*	*120*	*0*	*26*	*0*	*6*	*4*	*0*	*30*	*0*	*20*	*0*	*11*	*2*	*0*	*30*	*0*	*6*	*0*	*5*	*0*	*0*	*30*	*0*	***80***	***210***
	0							*36*							*33*							*11*								

Bachelor International Engineering – Mechanical Engineering (Incomings UPB)

- Incomings (UPB) 1st – 6th Semester

Abbreviations:

HWS = Hours per Week per Semester	L = Lecture	ET = Examination Type
CP = Credit Points	SL = Seminaristic Lecture	SE = Standard Examination
	E = Excercise Class	UT = Unit Test
	S = Seminar	PT 1 = Part 1 of the Unit Test
	P = Laboratory Class	PT 2 = Part 2 of the Unit Test

Studies in Medellín	**1st Semester**							**2nd Semester**							**3rd Semester**							**4th Semester**							**5th Semester**							**6th Semester**							**7th - 9th Semester**							**Total**		
	HWS					CCP	ET	HWS					CCP	ET	HWS					CCP	ET	HWS					CCP	ET	HWS					CCP	ET	HWS					CCP	ET	HWS					CP	ET			
Type of Course	L	S	P	E	SC			L	S	P	E	SC			L	S	P	E	SC			L	S	P	E	SC			L	S	P	E	SC			L	S	P	E	SC			L	S	P	E	SC							
Modules at UPB																																																				
Humanism and Civic Culture	4	0	0	0	0	2	SE																																											**4**	**-**	**2**
Language and Culture	4	0	0	0	0	2	SE																																										**4**	**-**	**2**
Differential Calculus	3	0	0	1	0	3	SE																																										**4**	**-**	**3**
Analytic Geometry	3	0	0	1	0	3	SE																																										**4**	**-**	**3**
Fundamentals of Chemistry	3	0	0	1	0	3	SE																																										**4**	**-**	**3**
Introduction to Mechanical Engineering	1	0	0	1	0	1	SE																																										**2**	**-**	**1**
Module of Applied Engineering 1	0	0	0	3	0	2	SE																																										**3**	**-**	**2**
General Ethics								2	0	0	0	0	1	SE																																				**2**	**-**	**1**
Integral Calculus								3	0	0	1	0	3	SE																																				**4**	**-**	**3**
Linear Algebra								3	0	0	1	0	3	SE																																				**4**	**-**	**3**
Measurement and Instrumentation								3	0	0	1	0	3	SE																																				**4**	**-**	**3**
Mechanical Drawing and CAD								3	0	0	1	0	3	SE																																				**4**	**-**	**3**
Materials Science								3	0	0	1	0	3	SE																																				**4**	**-**	**3**
Laboratory of Materials								0	0	2	0	0	1	SE																																				**2**	**-**	**1**
Christology															4	0	0	0	0	2	SE																													**4**	**-**	**2**
Vector Calculus															3	0	0	1	0	3	SE																													**4**	**-**	**3**
Differential Equations															3	0	0	1	0	3	SE																													**4**	**-**	**3**
Programming and Numerical Methods															3	0	0	1	0	3	SE																													**4**	**-**	**3**
Applied Statics															3	0	0	1	0	3	SE																													**4**	**-**	**3**
Module of Applied Engineering 2															0	0	0	3	0	2	SE																													**3**	**-**	**2**
Electricity and Magnetism																						3	0	0	1	0	3	SE																							**4**	**-**	**3**
Experimetal Methods in Physics																						0	0	2	0	0	2	SE																							**2**	**-**	**2**
Optative course in Basic Sciences																						X	X	X	X	X	3	SE																							**0**	**-**	**3**
Fundamentals of Mechanics of Materials																						3	0	0	1	0	2	SE																							**4**	**-**	**2**
Laboratory of Mechanics of Materials																						0	0	2	0	0	1	SE																							**2**	**-**	**1**
Applied Dynamics																						3	0	0	1	0	3	SE																							**4**	**-**	**3**
Thermodynamics																						3	0	0	1	0	3	SE																							**4**	**-**	**3**
Elective Humanistic Education Course 1																													X	X	X	X	X	2	SE															**0**	**-**	**2**
Entrepreneurship and Social Responsibility																													4	0	0	0	0	2	SE															**4**	**-**	**2**
Statistics and Design of Experiments																													3	0	0	1	0	3	SE															**4**	**-**	**3**
Applications of Mechanics of Materials																													3	0	0	1	0	3	SE															**4**	**-**	**3**
Mechanisms																													2	0	1	1	0	3	SE															**4**	**-**	**3**
Fluid Mechanics																													3	0	0	1	0	3	SE															**4**	**-**	**3**
Manufacturing Processes																																				4	0	0	0	0	1	SE							**4**	**-**	**1**
Manufacturing Processes Workshop																																				0	0	4	0	0	2	SE							**4**	**-**	**2**
Machine Elements																																				3	0	0	1	0	3	SE							**4**	**-**	**3**
Heat Transfer																																				3	0	0	1	0	3	SE							**4**	**-**	**3**
Management for Engineers																																				3	0	0	1	0	3	SE							**4**	**-**	**3**
Module of Applied Engineering 3																																				0	0	4	0	0	2	SE							**4**	**-**	**2**
Elective																																				X	X	X	X	X	3	SE							**0**	**-**	**3**
Modules at FH Münster																																																			
Modules incl. Bachelor Thesis																																																	90		**0**	**90**	**-**
TOTAL																																																			**120**	***99***
(* The CCPs earned at UPB will be recognized as 120 CPs at FH Münster)	*18*	*0*	*0*	*7*	*0*	*16*	*0*	*17*	*0*	*2*	*5*	*0*	*17*	*0*	*16*	*0*	*0*	*7*	*0*	*16*	*0*	*12*	*0*	*4*	*4*	*0*	*17*	*0*	*15*	*0*	*1*	*4*	*0*	*16*	*0*	*13*	*0*	*8*	*3*	*0*	*17*	*0*	*0*	*0*	*0*	*0*	*0*	*90*	*0*	***136***	***210***	
	25							*24*							*23*							*20*							*20*							*24*							*0*									

- Incomings (FH Münster) 7th – 9th Semester

Compulsory engineering modules

Compulsory elective engineering modules

Specific compulsory modules for the specialisation in Construction and Manufacturing Technology

Specific compulsory modules for the specialisation in Automotive and Drive Engineering

Integration modules

Practical modules

1st - 6th Semester Bachelor International Engineering - Mechanical Engineering (Incomings UPB)

1st - 6th sem.	Study in Latin America at Partner University (UPB)

7th - 9th Semester - Specialisation in Construction and Manufacturing Technology

7th sem.	Fluid Machines and CFD		Introduction to Finite Element Method		Hydraulics	Compulsory elective engineering module 1 *	Compulsory elective engineering module 2 *
8th sem.	Combustion Engines	Energy and Resource Efficiency	Digital Manufacturing	Production Engineering 2	Technical English	Compulsory elective engineering module 3 *	Compulsory elective engineering module 4 *
9th sem.	Practical Project				Bachelor Thesis		Colloquium

7th - 9th Semester - Specialisation in Automotive and Drive Engineering

7th sem.	Fluid Machines and CFD		Introduction to Finite Element Method		Automotive Development and Interconnection	Compulsory elective engineering module 1 *	Compulsory elective engineering module 2 *
8th sem.	Combustion Engines	Energy and Resource Efficiency	Car Body Engineering	Automotive Systems	Technical English	Compulsory elective engineering module 3 *	Compulsory elective engineering module 4 *
9th sem.	Practical Project				Bachelor Thesis		Colloquium

* One of the compulsory elective engineering modules of guest semester 1 and 2 has to be chosen from the compulsory elective engineering module catalog B (Computer Science). The order can be freely chosen by the students.

Abbreviations:			**Specialisations:**
HWS = Hours per Week per Semester	L = Lecture	ET = Examination Type	AD = Automotive and Drive Engineering
CP = Credit Points	SL = Seminaristic Lecture	SE = Standard Examination	CM = Construction and Manufacturing Technology
	E = Excercise Class	UT = Unit Test	
	S = Seminar	PT 1 = Part 1 of the Unit Test	
	P = Laboratory Class	PT 2 = Part 2 of the Unit Test	

Studies in Münster	**1st - 6th Semester**							**7th Sem. (SuSe)**							**8th Sem. (WiSe)**							**9th Sem. (SuSe)**							**Total**	
	HWS							HWS							HWS							HWS								
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	**HWS**	**CP**
Modules at UPB																														
Modules in total						120																								**120**
Modules at FH Münster																														
Fluid Machines and Computational Fluid Dynamics								2	0	1	1	0	5	UT															**4**	**5**
Compulsory Elective Engineering Module 1								0	0	1	1	3	5	UT															**5**	**5**
Compulsory Elective Engineering Module 2								0	0	1	1	3	5	UT															**5**	**5**
Introduction to Finite Element Methods								3	0	1	1	0	5	UT															**5**	**5**
Automotive Development and Interconnection (AD)								2	0	1	1	0	5	UT															**-**	**5**
Hydraulics (CM)								2	0	1	1	0		UT																
Energy and Resource Efficiency															0	0	1	1	2	5	UT								**4**	**5**
Technical English															0	4	0	0	0	5	UT								**4**	**5**
Combustion Engines															2	0	1	1	0	5	UT								**4**	**5**
Compulsory Elective Engineering Module 3															0	0	1	1	3	5	UT								**5**	**5**
Compulsory Elective Engineering Module 3															0	0	1	1	3	5	UT								**5**	**5**
Car Body Engineering (AD)															3	0	1	1	0	5	UT								**-**	**5**
Digital Manufacturing (CM)															2	0	1	1	0		UT									
Automotive Systems (AD)															2	0	1	1	0	5	UT								**-**	**5**
Production Engineering 2 (CM)															2	0	1	1	0		UT									
Internship																						X	X	X	X	X	15		**-**	**15**
Bachelor Thesis																						X	X	X	X	X	12		**-**	**12**
Oral Examination / Colloquium																						X	X	X	X	X	3	UT	**-**	**3**
TOTAL	*0*	*0*	*0*	*0*	*0*	*120*	*0*	*9*	*0*	*6*	*6*	*6*	*25*	*0*	*11*	*4*	*8*	*8*	*8*	*35*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***66***	***210***
	0							*27*							*39*							*0*									

Catalogue of Compulsory elective engineering modules A (UPB)	1st guest sem. (SuSe)							2nd guest sem. (WiSe)						
	HWS					CP	ET	HWS					CP	ET
Type of Course	L	S	P	E	SL			L	S	P	E	SL		
Modules at FH Münster														
Digitalisation in Mechanical Engineering								0	0	0	2	3	5	UT
Production Engineering 2								2	0	1	1	0	5	UT
Joining Technology								0	0	1	0	3	5	UT
Fundamentals of Agricultural Engineering	0	0	1	1	3	5	UT							
Energy Technology II - Hydrogen	3	0	0	1	0	5	UT							
Innovative Materials	0	0	1	1	3	5	UT							
Car Body Engineering								3	0	1	1	0	5	UT
Measurement Technology								0	0	2	1	2	5	UT
Basics in Operations Management								2	0	1	1	0	5	UT
Project Management	0	0	1	1	2	5	UT							
Quality Management	0	0	0	1	4	5	UT							
Closed Loop Control								2	0	1	1	0	5	UT
Programmable Logic Control	2	0	1	1	0	5	UT							
Computational Fluid Dynamics	2	0	2	1	0	5	UT							
Technical Project 1	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Technical Project 2	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Process Technology 1	0	0	1	1	3	5	UT							
Process Technology 2								0	0	1	1	3	5	UT
Heat and Mass Transfer	0	0	2	1	2	5	UT							
Catalogue of Compulsory elective engineering modules B														
Applied Computer Science								3	0	1	1	0	5	UT
Database Systems								0	0	2	1	2	5	UT
Introduction to Computer Science	2	0	0	2	0	5	UT							
Introduction to Digital Electronics	2	0	2	1	0	5	UT							
IT-Project Management								0	0	0	1	2	5	UT
Modeling and Simulation								0	0	2	1	2	5	UT
Numerical Software								0	0	2	0	2	5	UT
Object-oriented programming								0	0	3	0	2	5	UT
Virtual Reality in the factory planning	0	0	2	1	1	5	UT							
Total	*11*	*0*	*13*	*13*	*18*	*70*	*0*	*12*	*0*	*18*	*12*	*21*	*80*	*0*
	55							*63*						

One of the compulsory elective engineering modules of guest semester 1 and 2 has to be chosen from the compulsory elective engineering module catalog B (Computer Science). The order can be freely chosen by the students.

Bachelor International Engineering – Mechanical Engineering (Incomings USACH)

- Incomings (USACH) 1st – 5th Semester

Abbreviations:

HWS = Hours per Week per Semester
CP = Credit Points
L = Lecture
SL = Seminaristic Lecture
E = Excercise Class
S = Seminar
P = Laboratory Class
ET = Examination Type
UT = Unit Test
PT 1 = Part 1 of the Unit Test
PT 2 = Part 2 of the Unit Test

Studies in Santiago de Chile	**1st Semester**							**2nd Semester**							**3rd Semester**							**4th Semester**							**5th Semester**							**6th - 8th Semester**							**Total**	
	HWS							HWS							HWS							HWS							HWS							HWS								
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	**HWS**	**CP**
Modules at USACH																																												
Calculus 1 (Analysis)	6	0	0	2	0	7	UT																																				**8**	**7**
Calculus 1 (Algebra)	6	0	0	2	0	7	UT																																				**8**	**7**
Physics 1	4	0	1	2	0	7	UT																																				**7**	**7**
Introduction to Engineering	0	0	2	0	0	2	UT																																				**2**	**2**
Calculus 2 (Analysis)								6	0	0	2	0	7	UT																														**8**	**7**
Calculus 2 (Algebra)								4	0	0	2	0	6	UT																														**6**	**6**
Physics 2								4	0	1	2	0	7	UT																														**7**	**7**
Basics of Programming								4	0	2	0	0	5	UT																														**6**	**5**
Chemistry								4	0	0	2	0	5	UT																														**6**	**5**
Electricity and Magnetism															4	0	1	2	0	7	UT																						**7**	**7**
Communication															2	0	0	0	0	2	UT																						**2**	**2**
English 1															0	0	2	0	0	3	UT																						**2**	**3**
Statistics															4	0	0	2	0	5	UT																						**6**	**5**
(Engineering) Mechanics															4	0	0	2	0	7	UT																						**6**	**7**
Differential Educations and Numeric Methods															4	0	0	2	0	6	UT																						**6**	**6**
Mechanics of Materials																						4	0	2	2	0	7	UT																**8**	**7**
Basics of Economics																						4	0	0	2	0	5	UT																**6**	**5**
English 2																						0	0	2	0	0	3	UT																**2**	**3**
Electrical Engineering and Electronics																						4	0	1	0	0	5	UT																**5**	**5**
Technical Drawing / CAD																						2	0	2	0	0	7	UT																**4**	**7**
Material Science in Mechanical Engineering																						4	0	1	0	0	5	UT																**5**	**5**
Technical Drawing																													2	0	2	0	0	4	UT								**4**	**4**
Manufacturing Processes																													4	0	2	0	0	6	UT								**6**	**6**
Fluid Mechanics																													4	0	1	2	0	6	UT								**7**	**6**
Englisch 3																													0	0	2	0	0	3	UT								**2**	**3**
Risk Prevention / Work Security																													4	0	0	0	0	4	UT								**4**	**4**
Thermodynamics																													4	0	1	2	0	6	UT								**7**	**6**
Modules at FH Münster																																												
Modules in total incl. Bachelor Thesis																																									90		**0**	**90**
TOTAL	*16*	*0*	*3*	*6*	*0*	*23*	*0*	*22*	*0*	*3*	*8*	*0*	*30*	*0*	*18*	*0*	*3*	*8*	*0*	*30*	*0*	*18*	*0*	*8*	*4*	*0*	*32*	*0*	*18*	*0*	*8*	*4*	*0*	*29*	*0*	*0*	*0*	*0*	*0*	*0*	*90*	*0*	***147***	***234***
	25							*33*							*29*							*30*							*30*							*0*								

- Incomings (FH Münster) 6th – 8th Semester

Compulsory engineering modules

Compulsory elective engineering modules

Specific compulsory modules for the specialisation in Construction and Manufacturing Technology

Specific compulsory modules for the specialisation in Plant Engineering

Specific compulsory modules for the specialisation in Automotive and Drive Engineering

Integration modules

Practical modules

1st - 5th Semester Bachelor International Engineering - Mechanical Engineering (Incomings USACH)

1st - 5th sem.	Study in Latin America at Partner University (USACH)

6th - 8th Semester - Specialisation in Construction and Manufacturing Technology

6th sem.	Dynamics	Production Engineering 1	Introduction to Finite Element Method	Hydraulics	Compulsory elective engineering module 1 *	Compulsory elective engineering module 2 *
7th sem.	Combustion Engines	Production Engineering 2	Digital Manufacturing	Technical English	Compulsory elective engineering module 3 *	Compulsory elective engineering module 4 *
8th sem.	Practical Project			Bachelor Thesis		Colloquium

6th - 8th Semester - Specialisation in Plant Engineering

6th sem.	Dynamics	Production Engineering 1	Process Technology 1	Heat and Mass Transfer	Compulsory elective engineering module 1 *	Compulsory elective engineering module 2 *
7th sem.	Energy and Resource Efficiency	Apparatus and Plant Engineering	Process Technology 2	Technical English	Compulsory elective engineering module 3 *	Compulsory elective engineering module 4 *
8th sem.	Practical Project			Bachelor Thesis		Colloquium

6th - 8th Semester - Specialisation in Automotive and Drive Engineering

6th sem.	Dynamics	Production Engineering 1	Introduction to Finite Element Method	Automotive Development and Interconnection	Compulsory elective engineering module 1 *	Compulsory elective engineering module 2 *
7th sem.	Combustion Engines	Automotive Systems	Car Body Engineering	Technical English	Compulsory elective engineering module 3 *	Compulsory elective engineering module 4 *
8th sem.	Practical Project			Bachelor Thesis		Colloquium

* One of the compulsory elective engineering modules of guest semester 1 and 2 has to be chosen from the compulsory elective engineering module catalog B (Computer Science). The order can be freely chosen by the students.

Abbreviations:			**Specialisations:**
HWS = Hours per Week per Semester	L = Lecture	ET = Examination Type	AD = Automotive and Drive Engineering
CP = Credit Points	SL = Seminaristic Lecture	UT = Unit Test	CM = Construction and Manufacturing Technology
	E = Excercise Class	PT 1 = Part 1 of the Unit Test	PL = Plant Engineering
	S = Seminar	PT 2 = Part 2 of the Unit Test	
	P = Laboratory Class		

Studies in Münster	**1st - 5th Semester**							**6th Sem. (SuSe)**							**7th Sem. (WiSe)**							**8th Sem. (SuSe)**							**Total**	
	HWS							HWS							HWS							HWS								
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	**HWS**	**CP**
Modules at USACH																														
Modules in total						120																								**120**
Modules at FH Münster																														
Production Engineering 1								2	0	1	1	0	5	UT															**4**	**5**
Dynamics								2	0	0	2	0	5	UT															**4**	**5**
Compulsory Elective Engineering Module 1								0	0	1	1	3	5	UT															**5**	**5**
Compulsory Elective Engineering Module 2								0	0	1	1	3	5	UT															**5**	**5**
Introduction to Finite Element Methods (AD + CM)								3	0	1	1	0	5	UT															**-**	**5**
Process Technology 1 (PL)								0	0	1	1	3		UT																
Automotive Development and Interconnection (AD)								2	0	1	1	0	5	UT															**-**	**5**
Hydraulics (CM)								2	0	1	1	0		UT																
Heat and Mass Transfer (PL)								0	0	2	1	2		UT																
Technical English															0	4	0	0	0	5	UT								**4**	**5**
Compulsory Elective Engineering Module 3															0	0	1	1	3	5	UT								**5**	**5**
Compulsory Elective Engineering Module 4															0	0	1	1	3	5	UT								**5**	**5**
Combustion Engines (AD + CM)															2	0	1	1	0	5	UT								**-**	**5**
Energy and Resource Efficiency (PL)															0	0	1	1	2		UT									
Car Body Engineering (AD)															3	0	1	1	0	5	UT								**-**	**5**
Digital Manufacturing (CM)															2	0	1	1	0		UT									
Process Technology 2 (PL)															0	0	1	1	3		UT									
Automotive Systems (AD)															2	0	1	1	0	5	UT								**-**	**5**
Production Engineering 2 (CM)															2	0	1	1	0		UT									
Apparatus and Plant Engineering (PL)															3	0	1	1	0		UT									
Internship																						X	X	X	X	X	15		**-**	**15**
Bachelor Thesis																						X	X	X	X	X	12		**-**	**12**
Oral Examination / Colloquium																						X	X	X	X	X	3	UT	**-**	**3**
TOTAL	*0*	*0*	*0*	*0*	*0*	*120*	*0*	*11*	*0*	*9*	*10*	*11*	*30*	*0*	*14*	*4*	*10*	*10*	*11*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***90***	***210***
	0							*41*							*49*							*0*								

Catalogue of Compulsory elective engineering modules A (USACH)	1st guest sem. (SuSe)							2nd guest sem. (WiSe)						
	HWS					CP	ET	HWS					CP	ET
Type of Course	L	S	P	E	SL			L	S	P	E	SL		
Modules at FH Münster														
Process Engineering Project								X	X	X	X	X	5	MP
Digitalisation in Mechanical Engineering								0	0	0	2	3	5	UT
Energy and Resource Efficiency								0	0	1	1	2	5	UT
Production Engineering 2								2	0	1	1	0	5	UT
Joining Technology								0	0	1	0	3	5	UT
Fundamentals of Agricultural Engineering	0	0	1	1	3	5	UT							
Energy Technology II - Hydrogen	3	0	0	1	0	5	UT							
Innovative Materials	0	0	1	1	3	5	UT							
Car Body Engineering								3	0	1	1	0	5	UT
Measurement Technology								0	0	2	1	2	5	UT
Basics in Operations Management								2	0	1	1	0	5	UT
Project Management	0	0	1	1	2	5	UT							
Quality Management	0	0	0	1	4	5	UT							
Closed Loop Control								2	0	1	1	0	5	UT
Programmable Logic Control	2	0	1	1	0	5	UT							
Fluid Machines and Computational Fluid Dynamics (CFD)	2	0	1	1	0	5	UT							
Computational Fluid Dynamics	2	0	2	1	0	5	UT							
Technical Project 1	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Technical Project 2	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Process Technology 1	0	0	1	1	3	5	UT							
Process Technology 2								0	0	1	1	3	5	UT
Heat and Mass Transfer	0	0	2	1	2	5	UT							
Catalogue of Compulsory elective engineering modules B														
Applied Computer Science								3	0	1	1	0	5	UT
Database Systems								0	0	2	1	2	5	UT
Introduction to Computer Science	2	0	0	2	0	5	UT							
Introduction to Digital Electronics	2	0	2	1	0	5	UT							
IT-Project Management								0	0	0	1	2	5	UT
Modeling and Simulation								0	0	2	1	2	5	UT
Numerical Software								0	0	2	0	2	5	UT
Object-oriented programming								0	0	3	0	2	5	UT
Virtual Reality in the factory planning	0	0	2	1	1	5	UT							
Total	*13*	*0*	*14*	*14*	*18*	*75*	*0*	*12*	*0*	*19*	*13*	*23*	*90*	*0*
	59							*67*						

One of the compulsory elective engineering modules of guest semester 1 and 2 has to be chosen from the compulsory elective engineering module catalog B (Computer Science). The order can be freely chosen by the students.

Bachelor Mechanical Engineering

Compulsory engineering modules

Compulsory elective engineering modules

Specific compulsory modules for the specialisation in Construction and Manufacturing Technology

Specific compulsory modules for the specialisation in Plant Engineering

Specific compulsory modules for the specialisation in Automotive and Drive Engineering

Integration modules

Practical modules

1st - 3rd Semester

1st sem.	Mathematics 1	Physics	Statics	Basics of Construction Design	Materials Engineering 1	
2nd sem.	Mathematics 2 / Statistics	Machine Elements	Strength of Materials	Basics of Construction Design	Programming Basics	Materials Engineering 2
3. Sem.	Communication (Prerequisite to Practicle Project)	Introduction to Electrical Engineering	Thermodynamics	Fluid Mechanics	Design Engineering / CAD 1	Basics of Business Administration	Compulsory elective engineering module 1 *

4th - 6th Semester - Specialisation in Construction and Manufacturing Technology

4th sem.	Dynamics	Production Engineering 1	Introduction to Finite Element Method	Design Engineering / CAD 2	Hydraulics	Compulsory elective engineering module 2 *
5th sem.	Closed Loop Control	Production Engineering 2	Digital Manufacturing	Combustion Engines	Technical English	Compulsory elective engineering module 3 *
6th sem.	Practical Project			Bachelor Thesis		Colloquium

4th - 6th Semester - Specialisation in Plant Engineering

4th sem.	Dynamics	Production Engineering 1	Process Technology 1	Fluid Machines and CFD	Heat and Mass Transfer	Compulsory elective engineering module 2 *
5th sem.	Closed Loop Control	Apparatus and Plant Engineering	Energy and Resource Efficiency	Process Technology 2	Technical English	Compulsory elective engineering module 3 *
6th sem.	Practical Project			Bachelor Thesis		Colloquium

4th - 6th Semester - Specialisation in Automotive and Drive Engineering

4th sem.	Dynamics	Production Engineering 1	Introduction to Finite Element Method	Fluid Machines and CFD	Automotive Development and Interconnection	Compulsory elective engineering module 2 *
5th sem.	Closed Loop Control	Car Body Engineering	Automotive Systems	Combustion Engines	Technical English	Compulsory elective engineering module 3 *
6th sem.	Practical Project			Bachelor Thesis		Colloquium

* One of the compulsory elective engineering modules of semesters 3 to 5 has to be chosen from the compulsory elective engineering module catalog B (Computer Science).
The order can be freely chosen by the students.

Bachelor Mechanical Engineering / 1st – 3rd Semester

Subjects	1st Semester							2nd Semester							3rd Semester							4th - 6th Semester							Total	
	HWS					CP	ET	HWS					CP	ET	HWS					CP	ET	HWS					CP	ET		
Type of Course	L	S	P	E	SL			L	S	P	E	SL			L	S	P	E	SL			L	S	P	E	SL			**HWS**	**CP**
Compulsory engineering modules																														
Mathematics 1	4	0	0	2	0	8	UT																						**6**	**8**
Statics	2	0	0	2	0	5	UT																						**4**	**5**
Physics	3	0	0	2	0	6	UT																						**5**	**6**
Material Engineering 1	2	0	1	1	0	5	UT																						**4**	**5**
Basics of Construction Design	2	0	2	0	0	6	-	0	0	2	0	0	3	UT															**6**	**9**
Mathematics 2 / Statistics								6	0	0	3	0	7	UT															**9**	**7**
Strength of Materials								2	0	0	2	0	5	UT															**4**	**5**
Machine Elements								3	0	0	1	0	5	UT															**4**	**5**
Material Engineering 2								3	0	1	0	0	5	UT															**4**	**5**
Programming Basics								3	0	1	1	0	5	UT															**5**	**5**
Communication															0	0	0	2	0	-	UT								**2**	**0**
Introduction to Electrical Engineering															3	0	1	1	0	5	UT								**5**	**5**
Thermodynamics															3	0	0	1	0	5	UT								**4**	**5**
Fluid Mechanics															3	0	1	1	0	5	UT								**5**	**5**
Design Engineering / CAD 1															2	0	2	1	0	5	UT								**5**	**5**
Integration modules																														
Basics of Business Administration															2	0	0	2	0	5	UT								**4**	**5**
Compulsory elective engineering modules																														
Compulsory elective engineering module 1 *															0	0	1	1	3	5	UT								**5**	**5**
TOTAL (1. - 3.)	*13*	*0*	*3*	*7*	*0*	*30*	*0*	*17*	*0*	*4*	*7*	*0*	*30*	*0*	*13*	*0*	*5*	*9*	*3*	*30*	*0*								***81***	***90***
	23							*28*							*30*															

* One of the compulsory elective engineering modules of semesters 3 to 5 has to be chosen from the compulsory elective engineering module catalog B (Computer Science). The order can be freely chosen by the students.

– Specialisation in Construction and Manufactoring Technology / 4th – 6th Semester

Subjects	1st - 3rd Semester							4th Semester							5th Semester							6th Semester							Total	
	HWS					CP	ET	HWS					CP	ET	HWS					CP	ET	HWS					LP	PE		
Type of Course	L	S	P	E	SL			L	S	P	E	SL			L	S	P	E	SL			V	S	P	Ü	SU			**HWS**	**CP**
Compulsory engineering modules (CM)																														
Dynamics								2	0	0	2	0	5	UT															**4**	**5**
Production Engineering 1								2	0	1	1	0	5	UT															**4**	**5**
Introduction to Finite Element Method								3	0	1	1	0	5	UT															**5**	**5**
Design Engineering / CAD 2								0	0	2	1	0	5	UT															**3**	**5**
Hydraulics								2	0	1	1	0	5	UT															**4**	**5**
Closed Loop Control															2	0	1	1	0	5	UT								**4**	**5**
Production Engineering 2															2	0	1	1	0	5	UT								**4**	**5**
Digital Manufacturing															2	0	1	1	0	5	UT								**4**	**5**
Combustion Engines															2	0	1	1	0	5	UT								**4**	**5**
Integration modules																														
Technical English															0	4	0	0	0	5	UT								**4**	**5**
Compulsory elective engineering modules																														
Compulsory elective engineering module 2 *								0	0	1	1	3	5	UT															**5**	**5**
Compulsory elective engineering module 3 *															0	0	1	1	3	5	UT								**5**	**5**
Practical modules																														
Practical Project																						X	X	X	X	X	15		**0**	**15**
Bachelor Thesis																						X	X	X	X	X	12		**0**	**12**
Colloquium																						X	X	X	X	X	3		**0**	**3**
TOTAL (4. - 6.)								*9*	*0*	*6*	*7*	*3*	*30*	*0*	*8*	*4*	*5*	*5*	*3*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***50***	***90***
								25							*25*							*0*								
TOTAL (1. - 3.)	*43*	*0*	*13*	*23*	*3*	*90*	*0*																						***82***	***90***
	82																													
TOTAL	*43*	*0*	*13*	*23*	*3*	*90*	*0*	*9*	*0*	*6*	*7*	*3*	*30*	*0*	*8*	*4*	*5*	*5*	*3*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***132***	***180***
	82							*25*							*25*							*0*								

Catalogue of compulsory elective engineering modules A (CM)	SuSe							WiSe						
	HWS					CP	ET	HWS					CP	ET
Type of Course	L	S	P	E	SL			L	S	P	E	SL		
Compulsory elective engineering modules														
Automotive Systems								2	0	1	1	0	5	UT
Digitalization in Mechanical Engineering								0	0	0	2	3	5	UT
Automotive Development and Interconnection	2	0	1	1	0	5	UT							
Energy and Resource Efficiency								0	0	1	1	2	5	UT
Joining Technology								0	0	1	0	3	5	UT
Fundamentals of Agricultural Engineering	0	0	1	1	3	5	UT							
Energy Technology II - Hydrogen	3	0	0	1	0	5	UT							
Think Tank	2	0	1	2	0	5	UT	2	0	1	2	0	5	UT
Innovative Materials	0	0	1	1	3	5	UT							
Car Body Engineering								3	0	1	1	0	5	UT
Measurement Technology								0	0	2	1	2	5	UT
Basics in Operations Management								2	0	1	1	0	5	UT
Project Management	0	0	1	1	2	5	UT							
Quality Management	0	0	0	1	4	5	UT							
Programmable Logic Control	2	0	1	1	0	5	UT							
Fluid Machines and Computational Fluid Dynamics	2	0	1	1	0	5	UT							
Computational Fluid Dynamics	2	0	2	1	0	5	UT							
Technical Project 1	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Technical Project 2	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Process Technology 1	0	0	1	1	3	5	UT							
Process Technology 2								0	0	1	1	3	5	UT
Heat and Mass Transfer	0	0	2	1	2	5	UT							
Compulsory elective engineering modules B (Computer Science)														
Applied Computer Science								3	0	1	1	0	5	UT
Database Systems								0	0	2	1	2	5	UT
Introduction to Computer Science	2	0	0	2	0	5	UT							
Introduction to Digital Electronics	2	0	2	1	0	5	UT							
IT-Project Management								0	0	0	1	2	5	UT
Modeling and Simulation								0	0	2	1	2	5	UT
Numerical Software								0	0	2	0	2	5	UT
Object-oriented programming								0	0	3	0	2	5	UT
Virtual Realitiy in the factory planning	0	0	2	1	1	5	UT							
Total	*17*	*0*	*16*	*17*	*18*	*85*	*0*	*12*	*0*	*19*	*14*	*23*	*85*	*0*
	68							*68*						

* One of the compulsory elective engineering modules of semester 3 to 5 has to be chosen from the compulsory elective engineering module catalog B (Computer Science). The order can be freely chosen by the students.

– Specialisation in Plant Engineering / 4th – 6th Semester

Subjects	1st - 3rd Semester							4th Semester							5th Semester							6th Semester							Total	
	HWS							HWS							HWS							HWS								
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	**HWS**	**CP**
Compulsory engineering modules																														
Dynamics								2	0	0	2	0	5	UT															**4**	**5**
Production Engineering 1								2	0	1	1	0	5	UT															**4**	**5**
Process Technology 1								0	0	1	1	3	5	UT															**5**	**5**
Fluid Machines and CFD								2	0	1	1	0	5	UT															**4**	**5**
Heat and Mass Transfer								0	0	2	1	2	5	UT															**5**	**5**
Closed Loop Control															2	0	1	1	0	5	UT								**4**	**5**
Apparatus and Plant Engineering															3	0	1	1	0	5	UT								**5**	**5**
Energy and Resource Efficiency															0	0	1	1	2	5	UT								**4**	**5**
Process Technology 2															0	0	1	1	3	5	UT								**5**	**5**
Integration modules																														
Technical English															0	4	0	0	0	5	UT								**4**	**5**
Compulsory elective engineering modules																														
Compulsory elective engineering module 2 *								0	0	1	1	3	5	UT															**5**	**5**
Compulsory elective engineering module 3 *															0	0	1	1	3	5	UT								**5**	**5**
Practical modules																														
Practical Project																						X	X	X	X	X	15		**0**	**15**
Bachelor Thesis																						X	X	X	X	X	12		**0**	**12**
Colloquium																						X	X	X	X	X	3		**0**	**3**
TOTAL (4. - 6.)								*6*	*0*	*6*	*7*	*8*	*30*	*0*	*5*	*4*	*5*	*5*	*8*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***54***	***90***
								27							*27*							*0*								
TOTAL (1. - 3.)	*43*	*0*	*13*	*23*	*3*	*90*	*0*																						***82***	***90***
	82																													
TOTAL	*43*	*0*	*13*	*23*	*3*	*90*	*0*	*6*	*0*	*6*	*7*	*8*	*30*	*0*	*5*	*4*	*5*	*5*	*8*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***136***	***180***
	82							*27*							*27*							*0*								

Catalogue of compulsory elective engineering modules A (PL)	SuSe							WiSe						
	HWS					CP	ET	HWS					CP	ET
Type of Course	L	S	P	E	SL			L	S	P	E	SL		
Compulsory elective engineering modules														
Process Engineering Project								X	X	X	X	X	5	UT
Automotive Systems								2	0	1	1	0	5	UT
Digital Manufacturing								2	0	1	1	0	5	UT
Digitalization in Mechanical Engineering								0	0	0	2	3	5	UT
Automotive Development and Interconnection	2	0	1	1	0	5	UT							
Production Engineering 2								2	0	1	1	0	5	UT
Joining Technology								0	0	1	0	3	5	UT
Fundamentals of Agricultural Engineering	0	0	1	1	3	5	UT							
Energy Technology II - Hydrogen	3	0	0	1	0	5	UT							
Think Tank	2	0	1	2	0	5	UT	2	0	1	2	0	5	UT
Innovative Materials	0	0	1	1	3	5	UT							
Car Body Engineering								3	0	1	1	0	5	UT
Measurement Technology								0	0	2	1	2	5	UT
Basics in Operations Management								2	0	1	1	0	5	UT
Project Management	0	0	1	1	2	5	UT							
Quality Management	0	0	0	1	4	5	UT							
Programmable Logic Control	2	0	1	1	0	5	UT							
Technical Project 1	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Technical Project 2	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Combustion Engines								2	0	1	1	0	5	UT
Compulsory elective engineering modules B (Computer Science)														
Applied Computer Science								3	0	1	1	0	5	UT
Database Systems								0	0	2	1	2	5	UT
Introduction to Computer Science	2	0	0	2	0	5	UT							
Introduction to Digital Electronics	2	0	2	1	0	5	UT							
IT-Project Management								0	0	0	1	2	5	UT
Modeling and Simulation								0	0	2	1	2	5	UT
Numerical Software								0	0	2	0	2	5	UT
Object-oriented programming								0	0	3	0	2	5	UT
Virtual Realitiy in the factory planning	0	0	2	1	1	5	UT							
Summe	*13*	*0*	*10*	*13*	*13*	*65*	*0*	*18*	*0*	*20*	*15*	*18*	*95*	*0*
	49							*71*						

* One of the compulsory elective engineering modules of semester 3 to 5 has to be chosen from the compulsory elective engineering module catalog B (Computer Science). The order can be freely chosen by the students.

– Specialisation in Automotive and Drive Engineering / 4th – 6th Semester

Subjects	1st - 3rd Semester							4th Semester							5th Semester							6th Semester							Total	
	HWS					CP	ET	HWS					CP	ET	HWS					CP	ET	HWS					CP	ET		
Type of Course	L	S	P	E	SL			L	S	P	E	SL			L	S	P	E	SL			L	S	P	E	SL			**HWS**	**CP**
Compulsory engineering modules																														
Dynamics								2	0	0	2	0	5	UT															**4**	**5**
Production Engineering 1								2	0	1	1	0	5	UT															**4**	**5**
Introduction to Finite Element Method								3	0	1	1	0	5	UT															**5**	**5**
Fluid Machines and CFD								2	0	1	1	0	5	UT															**4**	**5**
Automotive Development and Interconnection								2	0	1	1	0	5	UT															**4**	**5**
Closed Loop Control															2	0	1	1	0	5	UT								**4**	**5**
Car Body Engineering															3	0	1	1	0	5	UT								**5**	**5**
Automotive Systems															2	0	1	1	0	5	UT								**4**	**5**
Combustion Engines															2	0	1	1	0	5	UT								**4**	**5**
Integration modules																														
Technical English															0	4	0	0	0	5	UT								**4**	**5**
Compulsory elective engineering modules																														
Compulsory elective engineering module 2 *								0	0	1	1	3	5	UT															**5**	**5**
Compulsory elective engineering module 3 *															0	0	1	1	3	5	UT								**5**	**5**
Practical modules																														
Practical Project																						X	X	X	X	X	15		**0**	**15**
Bachelor Thesis																						X	X	X	X	X	12		**0**	**12**
Colloquium																						X	X	X	X	X	3		**0**	**3**
TOTAL (4. - 6.)								*11*	*0*	*5*	*7*	*3*	*30*	*0*	*9*	*4*	*5*	*5*	*3*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***52***	***90***
								26							*26*							*0*								
TOTAL (1. - 3.)	*43*	*0*	*13*	*23*	*3*	*90*	*0*																						***82***	***90***
	82																													
TOTAL	*43*	*0*	*13*	*23*	*3*	*90*	*0*	*11*	*0*	*5*	*7*	*3*	*30*	*0*	*9*	*4*	*5*	*5*	*3*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***134***	***180***
	82							*26*							*26*							*0*								

Catalogue of compulsory elective engineering modules A (AD)	SuSe							WiSe						
	HWS					CP	ET	HWS					CP	ET
Type of Course	L	S	P	E	SL			L	S	P	E	SL		
Compulsory elective engineering modules														
Digital Manufacturing								2	0	1	1	0	5	MP
Digitalization in Mechanical Engineering								0	0	0	2	3	5	UT
Energy and Resource Efficiency								0	0	1	1	2	5	UT
Production Engineering 2								2	0	1	1	0	5	UT
Joining Technology								0	0	1	0	3	5	UT
Fundamentals of Agricultural Engineering	0	0	1	1	3	5	UT							
Energy Technology II - Hydrogen	3	0	0	1	0	5	UT							
Think Tank	2	0	1	2	0	5	UT	2	0	1	2	0	5	UT
Innovative Materials	0	0	1	1	3	5	UT							
Measurement Technology								0	0	2	1	2	5	UT
Basics in Operations Management								2	0	1	1	0	5	UT
Project Management	0	0	1	1	2	5	UT							
Quality Management	0	0	0	1	4	5	UT							
Programmable Logic Control	2	0	1	1	0	5	UT							
Technical Project 1	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Technical Project 2	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Process Technology 1	0	0	1	1	3	5	UT							
Process Technology 2								0	0	1	1	3	5	UT
Heat and Mass Transfer	0	0	2	1	2	5	UT							
Compulsory elective engineering modules B (Computer Science)														
Applied Computer Science								3	0	1	1	0	5	UT
Database Systems								0	0	2	1	2	5	UT
Introduction to Computer Science	2	0	0	2	0	5	UT							
Introduction to Digital Electronics	2	0	2	1	0	5	UT							
IT-Project Management								0	0	0	1	2	5	UT
Modeling and Simulation								0	0	2	1	2	5	UT
Numerical Software								0	0	2	0	2	5	UT
Object-oriented programming								0	0	3	0	2	5	UT
Virtual Realitiy in the factory planning	0	0	2	1	1	5	UT							
Total	*11*	*0*	*12*	*14*	*18*	*70*	*0*	*11*	*0*	*19*	*14*	*23*	*85*	*0*
	55							*67*						

* One of the compulsory elective engineering modules of semester 3 to 5 has to be chosen from the compulsory elective engineering module catalog B (Computer Science). The order can be freely chosen by the students.

Bachelor Computer Science in Mechanical Engineering

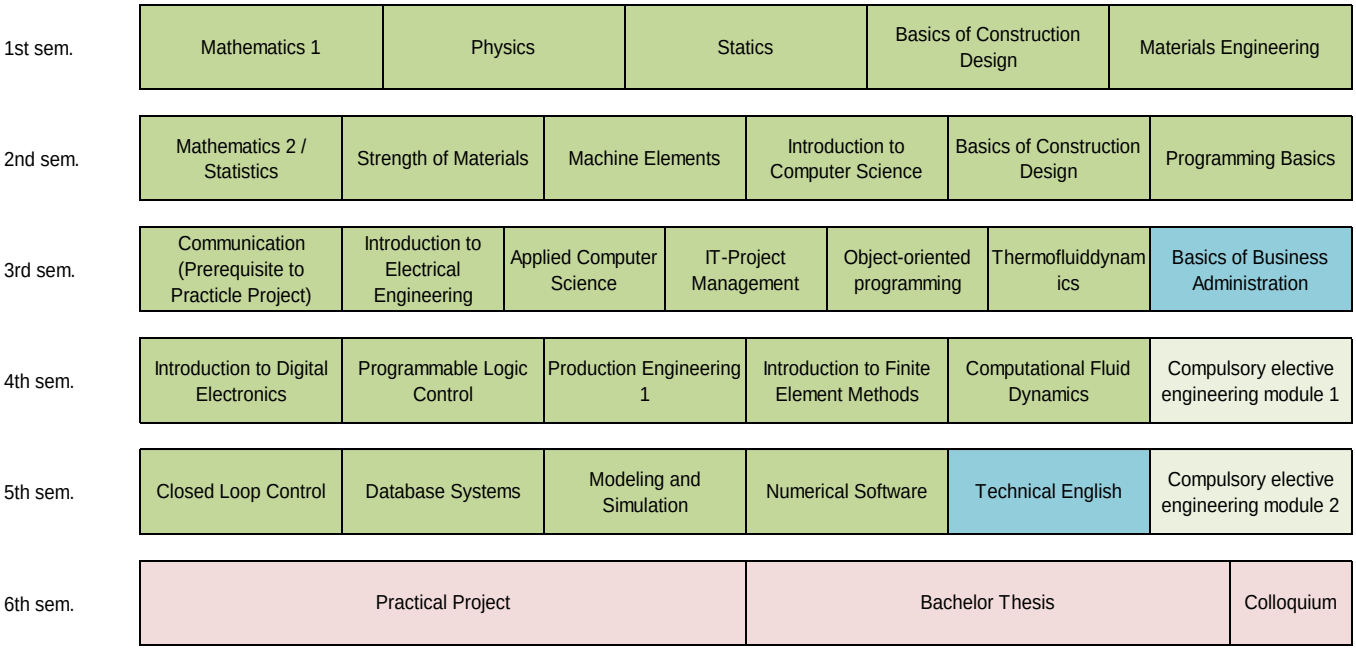
Compulsory engineering modules

Compulsory elective engineering modules

Integration modules

Practical modules

1st - 6th Semester



Subjects	1st Semester							2nd Semester							3rd Semester							4th Semester							5th Semester							6th Semester							Total	
	HWS							HWS							HWS							HWS							HWS							HWS								
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	**HWS**	**CP**
Compulsory engineering modules																																												
Mathematics 1	4	0	0	2	0	8	UT																																				**6**	**8**
Statics	2	0	0	2	0	5	UT																																				**4**	**5**
Physics	3	0	0	2	0	6	UT																																				**5**	**6**
Materials Engineering	3	0	1	1	0	5	UT																																				**5**	**5**
Basics of Construction Design	2	0	2	0	0	6	-	0	0	2	0	0	3	UT																														**6**	**9**
Mathematics 2 / Statistics								6	0	0	3	0	7	UT																														**9**	**7**
Strength of Materials								2	0	0	2	0	5	UT																														**4**	**5**
Machine Elements								3	0	0	1	0	5	UT																														**4**	**5**
Introduction to Computer Science								2	0	0	2	0	5	UT																														**4**	**5**
Programming Basics								3	0	1	1	0	5	UT																														**5**	**5**
Communication															0	0	0	2	0	-	UT																						**2**	**0**
Introduction to Electrical Engineering															3	0	1	1	0	5	UT																						**5**	**5**
Thermofluiddynamics															2	0	1	1	0	0	UT																						**4**	**0**
Applied Computer Science															3	0	1	1	0	5	UT																						**5**	**5**
Object-oriented programming															0	0	3	0	2	5	UT																						**5**	**5**
IT-Project Management															0	0	0	1	2	5	UT																						**3**	**5**
Introduction to Digital Electronics																						2	0	2	1	0	5	UT																**5**	**5**
Programmable Logic Control																						2	0	1	1	0	5	UT																**4**	**5**
Production Engineering 1																						2	0	1	1	0	5	UT																**4**	**5**
Introduction to Finite Element Methods																						3	0	1	1	0	5	UT																**5**	**5**
Computational Fluid Dynamics																						2	0	2	1	0	5	UT																**5**	**5**
Closed Loop Control																													2	0	1	1	0	5	UT								**4**	**5**
Database Systems																													0	0	2	1	2	5	UT								**5**	**5**
Modeling and Simulation																													0	0	2	1	2	5	UT								**5**	**5**
Numerical Software																													0	0	2	0	2	5	UT								**4**	**5**
Integration modules																																												
Basics of Business Administration															2	0	0	2	0	5	UT																						**4**	**5**
Technical English																													0	4	0	0	0	5	UT								**4**	**5**
Compulsory elective engineering modules																																												
Compulsory elective engineering module 1																						0	0	1	1	3	5	UT																**5**	**5**
Compulsory elective engineering module 2																													0	0	1	1	3	5	UT								**5**	**5**
Practical modules																																												
Practical Project																																				X	X	X	X	X	15		**0**	**15**
Bachelor Thesis																																				X	X	X	X	X	12		**0**	**12**
Colloquium																																				X	X	X	X	X	3		**0**	**3**
TOTAL	*14*	*0*	*3*	*7*	*0*	*30*	*0*	*16*	*0*	*3*	*9*	*0*	*30*	*0*	*10*	*0*	*6*	*8*	*4*	*25*	*0*	*11*	*0*	*8*	*6*	*3*	*30*	*0*	*2*	*4*	*8*	*4*	*9*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***135***	***175***
	24							*28*							*28*							*28*							*27*							*0*								

Catalogue of compulsory elective engineering modul	SuSe							WiSe						
	HWS					CP	ET	HWS					CP	ET
Type of Course	L	S	P	E	SL			L	S	P	E	SL		
Compulsory elective engineering modules														
Algorithms and Data Structures								0	0	2	1	3	5	UT
Automotive Systems								2	0	1	1	0	5	UT
Computer Graphics								0	0	2	0	2	5	UT
Digital Manufacturing								2	0	1	1	0	5	UT
Digitalization in Mechanical Engineering								0	0	0	2	3	5	UT
Hydraulics	2	0	1	1	0	5	UT							
Think Tank	2	0	1	2	0	5	UT	2	0	1	2	0	5	UT
Artificial Intelligence	0	0	2	0	2	5	UT							
Measurement Technology								0	0	2	1	2	5	UT
Basics in Operations Management								2	0	1	1	0	5	UT
Quality Management	0	0	0	1	4	5	UT							
Technical Project 1	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Technical Project 2	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Virtual Reality in the factory planning	0	0	2	1	1	5	UT							
Total	*4*	*0*	*6*	*5*	*7*	*35*	*0*	*8*	*0*	*10*	*9*	*10*	*50*	*0*
	22							*37*						

Bachelor Business Administration & Engineering majoring in Mechanical Engineering

Compulsory engineering modules

Compulsory elective engineering modules

Compulsory economics modules

Technical Language

Compulsory elective economics modules

Practical modules

1. bis 6. Semester

1. Sem.	Mathematics 1	Physics	Statics	Basics of Construction Design	Materials Engineering	
2. Sem.	Technical English	Mathematics 2 / Statistics	Programming Basics	Machine Elements	Basics of Construction Design	Strength of Materials
3. Sem.	General Business Administration	Basics in Operations Management	Introduction to Electrical Engineering	CIM	Design Engineering / CAD 1	Thermofluiddynamics
4. Sem.	Finance and Controlling	Business English	Marketing	Introduction to Computer Science	Production Engineering 1	Compulsory elective engineering module 1	Compulsory elective economics module 1
5. Sem.	Corporate Management	Business English	Logistics		Compulsory elective engineering module 2	Compulsory elective economics module 2
6. Sem.	Practical Project		Bachelor Thesis			Colloquium

Subjects	1st Semester							2nd Semester							3rd Semester							4th Semester							5th Semester							6th Semester							Total	
	HWS							HWS							HWS							HWS							HWS							HWS								
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	**HWS**	**CP**
Compulsory economics modules																																												
General Business Administration															3	0	0	3	0	6	MP																							**6**	**6**
Basics in Operations Management															2	0	1	1	0	5	MP																							**4**	**5**
Finance and Controlling																						3	0	0	3	0	6	MP																	**6**	**6**
Marketing																						3	0	0	3	0	6	MP																	**6**	**6**
Corporate Management																													3	0	0	3	0	6	MP									**6**	**6**
Technical Language																																												
Technical English								0	4	0	0	0	5	MP																															**4**	**5**
Business English																						0	2	0	0	0	2	-	0	2	0	0	0	3	MP									**4**	**5**
Compulsory elective economics modules																																												
Compulsory elective economics module 1																						1	2	0	1	0	5	MP																	**4**	**5**
Compulsory elective economics module 2																													1	2	0	1	0	5	MP									**4**	**5**
Compulsory engineering modules																																												
Mathematics	4	0	0	2	0	8	MP																																					**6**	**8**
Statics	2	0	0	2	0	5	MP																																					**4**	**5**
Physics	3	0	0	2	0	6	MP																																					**5**	**6**
Materials Engineering	3	0	1	1	0	5	MP																																					**5**	**5**
Basics of Construction Design	2	0	2	0	0	6	-	0	0	2	0	0	3	MP																															**6**	**9**
Mathematics 2 / Statistics								6	0	0	3	0	7	MP																															**9**	**7**
Strength of Materials								2	0	0	2	0	5	MP																															**4**	**5**
Machine Elements								3	0	0	1	0	5	MP																															**4**	**5**
Programming Basics								3	0	1	1	0	5	MP																															**5**	**5**
Introduction to Electrical Engineering															3	0	1	1	0	5	MP																							**5**	**5**
CIM															1	0	2	1	0	5	MP																							**4**	**5**
Design Engineering / CAD 1															2	0	2	1	0	5	MP																							**5**	**5**
Thermofluiddynamics															2	0	1	1	0	5	MP																							**4**	**5**
Introduction to Computer Science																						2	0	0	2	0	5	MP																	**4**	**5**
Production Engineering 1																						2	0	1	1	0	5	MP																	**4**	**5**
Logistics																													3	0	0	1	0	6	MP									**4**	**6**
Compulsory elective engineering modules																																												
Compulsory elective engineering module 1																						X	X	X	X	X	X	X	0	0	1	1	3	5	MP									**5**	**5**
Compulsory elective engineering module 2																						X	X	X	X	X	X	X	0	0	1	1	3	5	MP									**5**	**5**
Practical modules																																												
Practical Project																																										X	X	X	X	X	15		**0**	**15**
Bachelor Thesis																																										X	X	X	X	X	12		**0**	**12**
Colloquium																																										X	X	X	X	X	3		**0**	**3**
TOTAL	*14*	*0*	*3*	*7*	*0*	*30*	*0*	*14*	*4*	*3*	*7*	*0*	*30*	*0*	*13*	*0*	*7*	*8*	*0*	*31*	*0*	*11*	*4*	*1*	*10*	*0*	*29*	*0*	*7*	*4*	*2*	*7*	*6*	*30*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***132***	***180***
	24							*28*							*28*							*26*							*26*							*0*								

Catalogue of compulsory elective engineering modules	**SuSe**							**WiSe**						
	HWS					CP	ET	HWS					CP	ET
Type of Course	L	S	P	E	SL			L	S	P	E	SL		
Compulsory elective engineering modules														
Applied Computer Science								3	0	1	1	0	5	MP
Automotive Systems								2	0	1	1	0	5	MP
Digital Manufacturing								2	0	1	1	0	5	MP
Energy and Resource Efficiency								0	0	1	1	2	5	MP
Production Engineering 2								2	0	1	1	0	5	MP
Joining Technology								0	0	1	0	3	5	MP
Fundamentals of Agricultural Engineering	0	0	1	1	3	5	MP							
Energy Technology II - Hydrogen	3	0	0	1	0	5	MP							
Introduction to Finite Element Method	3	0	1	1	0	5	MP							
Think Tank	2	0	1	2	0	5	MP	2	0	1	2	0	5	MP
Car Body Engineering								3	0	1	1	0	5	MP
Measurement Technology								0	0	2	1	2	5	MP
Quality Management	0	0	0	1	4	5	MP							
Fluid Machines and Computational Fluid Dynamics	2	0	1	1	0	5	MP							
Computational Fluid Dynamics	2	0	2	1	0	5	MP							
Technical Project 1	X	X	X	X	X	5	MP	X	X	X	X	X	5	MP
Technical Project 2	X	X	X	X	X	5	MP	X	X	X	X	X	5	MP
Combustion Engines								2	0	1	1	0	5	MP
Process Technology 1	0	0	1	1	3	5	MP							
Process Technology 2								0	0	1	1	3	5	MP
Total	*12*	*0*	*7*	*9*	*10*	*50*	*0*	*16*	*0*	*12*	*11*	*10*	*65*	*0*
	38							*49*						

Bachelor Mechanical Engineering - Dual

Compulsory engineering modules

Compulsory elective engineering modules

Integration modules

Practical modules

1st - 9th Semester

1st sem.	Mathematics 1	Physics	Statics	
2nd sem.	Mathematics 2 / Statistics	Strength of Materials	Dynamics	Communication (Prerequisite to Practicle Project)
3rd sem.	Thermodynamics	Basics of Construction Design	Materials Engineering 1	Basics of Business Administration
4th sem.	Programming Basics	Basics of Construction Design	Materials Engineering 2	Machine Elements
5th sem.	Introduction to Electrical Engineering	Combustion Engines	Design Engineering / CAD 1	Fluid Mechanics
6th sem.	Production Engineering 1	Hydraulics	Design Engineering / CAD 2	Technical English
7th sem.	Production Engineering 2	Closed Loop Control	Joining Technology	Digital Manufacturing
8th sem.	Introduction to Finite Element Method	Compulsory elective engineering module 1 *	Compulsory elective engineering module 2 *	
9th sem.	Practical Project	Bachelor Thesis	Colloquium	

* 7th or 8th semester

Subjects	1st Semester							2nd Semester							3rd Semester						
	HWS							HWS							HWS						
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET
Compulsory engineering modules																					
Mathematics 1	4	0	0	2	0	8	UT														
Statics	2	0	0	2	0	5	UT														
Physik	3	0	0	2	0	6	UT														
Mathematics 2 / Statistics								6	0	0	3	0	7	UT							
Strength of Materials								2	0	0	2	0	5	UT							
Dynamics								2	0	0	2	0	5	UT							
Communikation								0	0	0	2	0	-	UT							
Materials Engineering 1															2	0	1	1	0	5	UT
Thermodynamics															3	0	0	1	0	5	UT
Basics of Construction Design															2	0	2	0	0	6	-
Machine Elements																					
Materials Engineering 2																					
Programming Basics																					
Combustion Engines																					
Fluid Mechanics																					
Design Engineering / CAD 1																					
Introduction to Electrical Engineering																					
Design Engineering / CAD 2																					
Production Engineering 1																					
Hydraulics																					
Production Engineering 2																					
Closed Loop Control																					
Joining Technology																					
Digital Manufacturing																					
Introduction to Finite Element Method																					
Integration modules																					
Basics of Business Administration															2	0	0	2	0	5	UT
Technical English																					
Compulsory elective engineering modules																					
Compulsory elective engineering module 1																					
Compulsory elective engineering module 2																					
Practical modules																					
Practical Project																					
Bachelor Thesis																					
Colloquium																					
TOTAL	*9*	*0*	*0*	*6*	*0*	*19*	*0*	*10*	*0*	*0*	*9*	*0*	*17*	*0*	*9*	*0*	*3*	*4*	*0*	*21*	*0*
	15							*19*							*16*						

Subjects	4th Semester							5th Semester							6th Semester						
	HWS							HWS							HWS						
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET
Compulsory engineering modules																					
Mathematics 1																					
Statics																					
Physik																					
Mathematics 2 / Statistics																					
Strength of Materials																					
Dynamics																					
Communikation																					
Materials Engineering 1																					
Thermodynamics																					
Basics of Construction Design	0	0	2	0	0	3	UT														
Machine Elements	3	0	0	1	0	5	UT														
Materials Engineering 2	3	0	1	0	0	5	UT														
Programming Basics	3	0	1	1	0	5	UT														
Combustion Engines								2	0	1	1	0	5	UT							
Fluid Mechanics								3	0	1	1	0	5	UT							
Design Engineering / CAD 1								2	0	2	1	0	5	UT							
Introduction to Electrical Engineering								3	0	1	1	0	5	UT							
Design Engineering / CAD 2															0	0	2	1	0	5	UT
Production Engineering 1															2	0	1	1	0	5	UT
Hydraulics															2	0	1	1	0	5	UT
Production Engineering 2																					
Closed Loop Control																					
Joining Technology																					
Digital Manufacturing																					
Introduction to Finite Element Method																					
Integration modules																					
Basics of Business Administration																					
Technical English															0	4	0	0	0	5	UT
Compulsory elective engineering modules																					
Compulsory elective engineering module 1																					
Compulsory elective engineering module 2																					
Practical modules																					
Practical Project																					
Bachelor Thesis																					
Colloquium																					
TOTAL	*9*	*0*	*4*	*2*	*0*	*18*	*0*	*10*	*0*	*5*	*4*	*0*	*20*	*0*	*4*	*4*	*4*	*3*	*0*	*20*	*0*
	15							*19*							*15*						

Subjects	7th Semester							8th Semester							9th Semester							Total	
	HWS							HWS							HWS								
Type of Course	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	L	S	P	E	SL	CP	ET	**HWS**	**CP**
Compulsory engineering modules																							
Mathematics 1																						**6**	**8**
Statics																						**4**	**5**
Physik																						**5**	**6**
Mathematics 2 / Statistics																						**9**	**7**
Strength of Materials																						**4**	**5**
Dynamics																						**4**	**5**
Communikation																						**2**	**-**
Materials Engineering 1																						**4**	**5**
Thermodynamics																						**4**	**5**
Basics of Construction Design																						**6**	**9**
Machine Elements																						**4**	**5**
Materials Engineering 2																						**4**	**5**
Programming Basics																						**5**	**5**
Combustion Engines																						**4**	**5**
Fluid Mechanics																						**5**	**5**
Design Engineering / CAD 1																						**5**	**5**
Introduction to Electrical Engineering																						**5**	**5**
Design Engineering / CAD 2																						**3**	**5**
Production Engineering 1																						**4**	**5**
Hydraulics																						**4**	**5**
Production Engineering 2	2	0	1	1	0	5	UT															**4**	**5**
Closed Loop Control	2	0	1	1	0	5	UT															**4**	**5**
Joining Technology	0	0	1	0	3	5	UT															**4**	**5**
Digital Manufacturing	2	0	1	1	0	5	UT															**4**	**5**
Introduction to Finite Element Method								3	0	1	1	0	5	UT								**5**	**5**
Integration modules																							
Basics of Business Administration																						**4**	**5**
Technical English																						**4**	**5**
Compulsory elective engineering modules																							
Compulsory elective engineering module 1	X	X	X	X	X	X	X	0	0	1	1	3	5	UT								**5**	**5**
Compulsory elective engineering module 2	X	X	X	X	X	X	X	0	0	1	1	3	5	UT								**5**	**5**
Practical modules																							
Practical Project															X	X	X	X	X	15		**0**	**15**
Bachelor Thesis															X	X	X	X	X	12		**0**	**12**
Colloquium															X	X	X	X	X	3		**0**	**3**
TOTAL	*6*	*0*	*4*	*3*	*3*	*20*	*0*	*3*	*0*	*3*	*3*	*6*	*15*	*0*	*0*	*0*	*0*	*0*	*0*	*30*	*0*	***130***	***180***
	16							*15*							*0*								

Catalogue of compulsory elective engineering modules	WiSe							SuSe						
	HWS					CP	ET	HWS					CP	ET
Type of Course	L	S	P	E	SL			L	S	P	E	SL		
Compulsory elective engineering modules														
Digitalization in Mechanical Engineering	0	0	0	2	3	5	UT							
Energy and Resource Efficiency	0	0	1	1	2	5	UT							
Fundamentals of Agricultural Engineering								0	0	1	1	3	5	UT
Energy Technology II - Hydrogen								3	0	0	1	0	5	UT
Think Tank	2	0	1	2	0	5	UT	2	0	1	2	0	5	UT
Innovative Materials								0	0	1	1	3	5	UT
Car Body Engineering	3	0	1	1	0	5	UT							
Measurement Technology	0	0	2	1	2	5	UT							
Basics in Operations Management	2	0	1	1	0	5	UT							
Technical Project								X	X	X	X	X	5	UT
Project Management								0	0	1	1	2	5	UT
Quality Management								0	0	0	1	4	5	UT
Programmable Logic Control								2	0	1	1	0	5	UT
Fluid Machines and Computational Fluid Dynamics								2	0	1	1	0	5	UT
Computational Fluid Dynamics								2	0	2	1	0	5	UT
Technical Project 1	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Technical Project 2	X	X	X	X	X	5	UT	X	X	X	X	X	5	UT
Process Technology 1								0	0	1	1	3	5	UT
Process Technology 2	0	0	1	1	3	5	UT							
Heat and Mass Transfer								0	0	2	1	2	5	UT
Compulsory elective engineering modules B (Computer Science)														
Applied Computer Science	3	0	1	1	0	5	UT							
Database Systems	0	0	2	1	2	5	UT							
Introduction to Computer Science								2	0	0	2	0	5	UT
Introduction to Digital Electronics								2	0	2	1	0	5	UT
IT-Project Management	0	0	0	1	2	5	UT							
Modeling and Simulation	0	0	2	1	2	5	UT							
Numerical Software	0	0	2	0	2	5	UT							
Object-oriented programming	0	0	3	0	2	5	UT							
Virtual Realitiy in the factory planning								0	0	2	1	1	5	UT
Total	*10*	*0*	*17*	*13*	*20*	*75*	*0*	*15*	*0*	*15*	*16*	*18*	*85*	*0*
	60							*64*						

Bachelor – module descriptions

Algorithms and Data Structures

1	**1.1 Title of module (GER / ENG)** **Algorithmen und Datenstrukturen /** **Algorithms and Data Structures**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **ETI.1.0009**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering	**CE**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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)	Seminaristic Lecture	**3**	**45**	**150**	**5**
	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		**60**		
	Total		Total non-contact hours **60**		

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 recognise algorithmic structures in concrete problems, and to find, assess, select and adapt solutions in the form of algorithms, implementing them in the programming language C.

5.2 Course content

Introduction:
- Foundations and brief recapitulation of C
- Elementary data structures
- Trees
- Recursion
- Analysis and implementation of algorithms
- Sorting algorithms
- Search algorithms
- Searching in strings
- Pattern matching and parsing
- Compression and cryptology
- Geometric algorithms
Algorithms for graphs:
- Elementary algorithms, context, directed graphs, weighted graphs
- Random numbers
- Arithmetic
- Gaussian elimination
Practical course:
Queues; the eight queens problem; comparison of sorting methods; hashing; searching in strings; simple closed path; topological sorting.

→ 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.

Typical programming tasks include the sorting, search, compression and encryption of data. You learn how best to approach such standard problems and to solve them using 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: ….)*

Basic knowledge of computer science and the C programming language

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 or oral examination

6.4 Requirements for admission to examination

Successful participation in the practical phase

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. T. Weik

7.3 Professors (optional):

Professor Dr.-Ing. T. Weik

7.4 Maximum number of participants (optional)

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

[**1] R. Sedgewick: Algorithmen in C, Pearson Studium, 2005.**

Apparatus and Plant Engineering

1	**1.1 Title of module (GER / ENG)** **Apparate- und Anlagenbau /** **Apparatus and Plant Engineering**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0013**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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**	**150**	**5**
	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, follow-up work				
	preparation for the examination				
	Total		Total non-contact hours **75**		

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:
a) Identify the physical sub-processes of process engineering plant
b) Apply the sub-processes of conceptual designing plant and apparatus in process engineering
c) Assess technical concepts for the safe design of process engineering plant and apparatus
d) Apply rules for dimensioning pressure equipment and piping
e) Develop technical documents (e.g. MS Excel calculation sheets) in group work
f) Develop original process simulations (using CAS) for the computational design and balancing of binary phase equilibria

The practical course and exercise class enable students to develop and apply solution strategies for the set tasks, building on the specialist knowledge gained during the lectures, and to formulate and document the results.

5.2 Course content

- **Apparatus and plant (AppAn) as the link between apparatus and process engineering (materials)**
- **Forms and functions of apparatus for material conversion and material separation**
- **Strength behaviour and dimensioning specifications (comparison)**
- **Welding techniques**
- **Apparatus and pressure vessel designs**
- **Closure constructions**
- **Safety concepts**
- **Piping and instrumentation diagrams (explanation and development)**
- **Sets of regulations and directives (e.g. CE, Pressure Equipment Directive applies to the machinery directive 2006/42/EC)**
- **Specification sheets**
- **Thermal calculation of apparatus and tube sheets**
- **Computer-aided simulation (CAS) computer practical**

→ 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 on the acquired competencies, you will be able to carry out planning, design, calculations and technical documentation of process engineering apparatus and plant technology, suitable for professional application in many fields: Mechanical and plant engineering, utilities engineering, building services and process engineering, and materials technologies.

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 or oral examination

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. Wäsche

7.3 Professors (optional):

Professor Dr.-Ing. A. Wäsche

7.4 Maximum number of participants (optional

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

- **Apparate- und Anlagentechnik. E. Klapp**
- **Planung und Bau verfahrenstechnischer Anlagen. Bernecker**
- **Planung im Anlagenbau. Ed. W. Wagner**
- **Taschenbuch der Verfahrenstechnik. K. Schwister**

Applied Computer Science

1	1.1 Title of module (GER / ENG) **Angewandte Informatik / Applied Computer Science**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0011**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering	**C**	**3**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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**	**150**	**5**
	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		**75**		
	Total		Total non-contact hours **75**		

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 are able to develop data-based models using programming methods. The competences are achieved to measure an unknown system in a meaningful way, to analyze the measurement data as well as to develop a model from it, and to evaluate the quality of the model.

Through the exercise and the practical course the theoretical basics from the lecture are deepened and in particular the safe handling of Jupyter notebooks (Python) is acquired.

5.2 Course content

- **Evaluation and visualization of measurement data**
- **Error measures**
- **Design of experiments (DoE)**
- **Model approaches: Lookup table, polynomials, grey-box models, artificial neural networks**
- **Use of optimization algorithms for parameter determination**
- **Training of artificial neural networks**

→ 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 systems cannot be modeled by simple physical relationships. An alternative approach is using mathematical models. You are able to develop such models using programming methods.

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: Mathematics 1, Programming Basics

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. 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.)

Artificial Intelligence

1	1.1 Title of module (GER / ENG) **Künstliche Intelligenz / Artificial Intelligence**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0078 (alt-ETI.1.0132)**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**5**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**5**
	Computer Science in Mechanical Engineering	**CE**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)	**CE**	**5**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	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, follow-up work, preparation for the 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?)

The course considers the development of competencies in the following fields:

Professional competencies:

Students gather an overview of the area of expertise „artificial intelligence“ and know fields of of applications. They have an overview of classical fundamental concepts and methods of artificial intelligence.

Social competencies:

Through regular discussions in small teams within the practical sessions and with the instructors, the students improve on their teamwork and communication skills. They are able to communication and explain technical matters and contexts.

Personal competencies:

The course addresses approaches (paradigms) the have been barely considered at this point of the course of studies. It requires the eagerness to learn by the students**. They relate their results in the practical sessions and the lecture contents. Students can realistically assess and reflect on the quality.**

Methodological competencies:

Preparation, follow-up work, preparation for the examination

5.2 Course content

Some Theory:

Biological background of neural networks.

McCulloch-Pitts neurons and boolean networks.

Perceptron, learning algorithm, Fähigkeitsanalyse;

Learning in multi layer networks, backpropagation, convergency.

Hopfield networks and pattern recognition.

Kohonen networks and self organizing maps.

Practical course:

Implementation of neural networks with Matlab.

→ 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.

This lecture introduces methods for simulation of complex systems in AI. It focusses on modelling systems as neural networks and implementation on basis of standard mathematical software such as Matlab. Learning algorithms and convergency behaviour for several kinds of nets are treated in detail.

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: ….)*

Computer science and mathematics modules of semester 1 – 3 (according to study plan) must be passed

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

Successful participation in the practical course: all practical sessions need to be passed successfully
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. E. Finke

7.3 Professors (optional):

Professor Dr. M. Geisler

7.4 Maximum number of participants (optional)

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

Literature (Selection):

[1] S. Russel, P. Norvig: „Artificial Intelligence A Modern Approach“
[2] W. Ertel: „Grundkurs Künstliche Intelligenz: Eine praxisorientierte Einführung“
[3] M. T. Jones: „Artificial Intelligence, A Systems Approach“
- **[4] Dan W. Patterson „Künstliche neuronale Netze“**

[5] Raul Rojas „Theorie der neuronalen Netze“
[6] Adolf Grauel „Neuronale Netze. Grundlagen und mathematische Modellierung.“
[7] Domschke/Drexl "Operations Research"

Software: Matlab, Scilab,

Automotive Development and Interconnection

1	1.1 Title of module (GER / ENG) **Fahrzeugentwicklung und -vernetzung / Automotive Development and Interconnection**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0206**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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**	**150**	**5**
	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, follow-up work		**90**		
	written elaboration, presentation				
	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 can understand the structure and function of systems for environment sensing and algorithms for object recognition. They are able to analyze the application fields of different sensor principles for environment recognition (camera, radar, ...) and their combination (sensor fusion) and to recognize the potential of future systems as well as the requirements for sensors and actuators.

The internships not only serve to provide a more in-depth description of the technical context, but also specifically promote critical reflection on the results achieved, independent work and the ability to work in a team.

5.2 Course content

In-vehicle communication

- **sensor technology**
- **Data acquisition in the vehicle**
- **Sensor data processing**
- **Data buses for in-vehicle communication**

Connected cars

- **Data storage and data analysis in the cloud**
- **Data security and reliability**
- **Communication technologies (cellular and short-range technologies)**
- **Car-to-car communication and communication with the environment (smart cities)**
- **Autonomus driving**

→ 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.

Vehicles are becoming increasingly intelligent, which increases the complexity of collected data. You learn which sensors vehicles use to collect information and how it is processed, focusing in particular on data security.

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.)

Automotive Systems

1	1.1 Title of module (GER / ENG) **Automotive Systems**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0195**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering	**CE**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)		

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**	**150**	**5**
	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, follow-up work		**90**		
	written elaboration, presentation				
	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 can understand the structure and function of modern various vehicle types and components. They are able to apply evaluation methods for these systems as well as boundary conditions for mobility (sustainability, safety, reliability, ...).

The practical exercises not only serve to provide a more in-depth description of the technical context, but also specifically promote critical reflection on the results achieved, independent work and the ability to work in a team.

5.2 Course content

- **Vehicle components**
- **Vehicle electronics**
- **Energy storage technologies**
- **Vehicle mechatronics**
- **Electric driving and alternative drive technology**
- **Driver assistance systems**
- **Reliability and quality management**

→ 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 components do vehicles consist of? How are they driven? And how do driving assistance systems work? This module addresses these and other basic issues concerning mobility. You directly apply your newly acquired knowledge to practical exercises.

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. Brockmann

7.3 Professors (optional):

Dr.-Ing. M. Brockmann

7.4 Maximum number of participants (optional)

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

Basics of Business Administration

1	**1.1 Title of module (GER / ENG)** **Grundlagen der Betriebswirtschaftslehre / Basics of Business Administration**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **ITB.1.0027**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**3**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**3**
	Computer Science in Mechanical Engineering	**C**	**3**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**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**	**150**	**5**
	Exercise	**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, follow-up work, preparation for the 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 basics of general business administration. In particular, they will be able to describe the value chain, from materials management and production to marketing and supporting areas. They will, for example, be able to run ABC analyses, calculate the break-even point, economic order quantities and contribution margins, and also apply product program planning. These aspects will enable students to practice their mathematical/analytical skills, problem-solving skills and capacity for reflection, and to learn scientific working methods.

5.2 Course content

Based on the foundations of business management, the following partial areas are addressed:

Object and methods of business administration

- **Business administration as an academic discipline**
- **Basis of operational decisions**
- **Decisions on legal form**

Business performance processes

- **Materials management**
- **Production management**
- **Marketing**

Business financial processes

- **External accounting**
- **Controlling**
- **Investment and finance**

Elements and structures of management systems

- **Organisation**
- **Human resources management**
- **Foundations of corporate management**

Different weighting is given to the partial areas at the advanced stage. Students systematically acquire the course content during lectures and exercise classes with the involvement of students.

→ 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.

Ordering, production and sales: this module focuses on business processes related to the value chain. You understand the tasks involved, and learn how to perform them using the relevant tools.

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 or oral examination

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.)

Basics of Construction Design

1	**1.1 Title of module (GER / ENG)** **Grundlagen der Konstruktion /** **Basics of Construction Design**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0050**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**1+2**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**1+2**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**1+2**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**1+2**
	Computer Science in Mechanical Engineering	**C**	**1+2**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**1+2**
	Mechanical Engineering (dual study)	**C**	**3+4**

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+0**	**30**	**270**	**9**
	Practical course	**2+2**	**60**		
	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, follow-up work, preparation for the 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 of the module, students will be able to apply basic methods of construction design. These methods form the basis of construction design work in companies. Specifically, students will be able to read technical drawings and to create, explain and assess manufacturing and assembly drawings in the form of a sketch. Students will be able to design and develop assemblies of machines (including moving parts and cast parts), taking into account functionality, the manufacturing process, service requirements, standards and costs, and to plan the necessary production processes. Students will be able to transfer these construction designs into a high-end CAD system (NX). Students will therefore be capable of implementing and assessing their own construction design results in terms of specifications. In addition, students will be able to analyse, assess and design the fit and the tolerance chains as required. By applying tolerance chains, students learn the following skills: one- and two-dimensional chains, as well as arithmetic and approximate stochastic chain analysis. Students will be able to identify and assess surface, geometrical and position tolerances, and to work out appropriate tolerances for their own construction designs. They will have the skills required to confidently apply elements of methodological construction (such as the morphological box, FMEA and TRIZ), enabling them to develop the methodologically correct way to implement specific construction designs.
The practical course enables students to transfer the specialist knowledge gained in the lectures to practical tasks. Students will be able to use different techniques to manually create technical drawings in conformity with standards. Depending on the component or assembly, they will also be able to take into account various production-oriented design guidelines. Using the design environment in the Siemens NX program package, students will be able to create complex, three-dimensional components according to drawings. Students will be able to apply the computational methods learned (e.g. tolerance chain) to the application examples provided. The skills learned will help students to accompany the design process professionally and confidently in their future career.

5.2 Course content

- **Presentation of workpieces**
- **Dimensioning of workpieces, production-oriented dimensioning**
- **Tolerances and fit, geometrical and position tolerances**
- **Surface specifications and edge conditions**
- **Parts list**
- **Tolerance chains**
- **Press fit calculation**
- **General information on standards**
- **3D technology**
- **Failure modes and effect analysis (FMEA)**
- **Theory of inventive problem solving (TRIZ)**
- **Methodological construction**
- **CAD system NX CAD techniques for creating and dimensioning basic geometric constructions in 2D and 3D**

→ 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.

Construction design is all about skilfully combining your theoretical and practical knowledge – which is exactly what you practise in this module. Besides acquiring mathematical and legal basics, you practise computer-aided construction design.
In the second part of the module, you apply your knowledge of construction design to practical tasks. You sketch technical drawings of components and then display them in 3D on the computer.

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.) **Recommended reading: Lecture and practical course notes**

Basics in Operations Management

1	**1.1 Title of module (GER / ENG)** **Produktionswirtschaftliche Anwendungen /** **Basics in Operations Management**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **ITB.1.0079**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering	**CE**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**3**
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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**	**150**	**5**
	Exercise	**1**	**15**		
	Practical period	**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, follow-up work, preparation for the 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 this module, students will be able to (expertise)

- **Identify, name and plan production resources required in a production system;**
- **Assess the potential of production systems and evaluate the result of improvement initiatives by using relevant key performance indicators;**
- **Compare production systems with each another and make clear the differences between the production processes in order to be able to identify best practices and to find good examples for companies;**
- **Develop production programmes so that they can provide skilled support and advice in production control practice;**
- **Recognise waste in production processes due to batch production, enabling them to develop an eye for it in practice, too.**

In addition, after successful completion, students will be able to (methodological and social skills)

- **Consider complex issues and develop solutions within a team, enabling them to solve problems in collaboration with colleagues in their future career;**
- **Analytically solve production management problems by using formulae and algorithms, enabling them to use them for their intended purpose in practice, too;**
- **Use an ERP system (in particular SAP) to plan and control factors of production, enabling them to successfully apply the methods and tools learned in practice, without further training;**
- **Use multimedia support to teach themselves key aspects of production management, enabling them to acquire the skill of independent learning and to apply this skill in their future career with a view to lifelong learning.**

5.2 Course content

A. Classification of production systems and processes
B. Organisation of production systems – production equipment, materials, processes
C. Planning of the production programme
D. Production control
E. Modern concepts of production management
F. SAP application in procurement and production (practical course)
G. Lean application (practical course)

→ 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.

Production management is about the economic use of resources. You learn about the main tools involved, and apply them to exercises and 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)

Written or oral examination

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. pol. Ralf Ziegenbein

7.3 Professors (optional):

Professor Dr. rer. pol. Ralf Ziegenbein / Academic staff of ITB

7.4 Maximum number of participants (optional)

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

Textbook (mandatory): Ziegenbein, Toolbox Produktionsmanagement, current edition (only available in German language)

Basics of Reciprocating Machines

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Grundlagen der Kolbenmaschinen / Basics of Reciprocating Machines**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0049**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology (General Mechanical Engineering)	**C**	**3**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**5**

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**	**150**	**5**
	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, follow-up work, preparation for the 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. In particular, they will be able to understand and assess the different technical designs of reciprocating engines. Students will be able to solve special tasks related to the dynamics of reciprocating engines.
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

- **Classification and overview**
- **Kinematics and dynamics of reciprocating engines**
- **Work machines: pumps and compressors**
- **Piston combustion engines**
- **Modern developments and trends**

→ 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.

Those involved professionally with engine technology should understand how reciprocating engines work. You therefore explore various designs of these engines, and apply the knowledge gained to practical problems.

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.)

Recommended reading:
Lecture notes;
Küttner: Kolbenmaschinen, Vieweg-Verlag

Car Body Engineering

1	1.1 Title of module (GER / ENG) **Karosserietechnik / Car Body Engineering**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0063**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C / CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 assess modern car bodies in terms of structural properties and car body design, taking into account the relevant economic, legal and technical frameworks. They will be able to describe the relevant development tools, specifically select materials for body components, dimension components appropriately, develop optimisation proposals, and analyse alternative component or car body designs and concepts. In their future career, students will be able to thoroughly compare and assess the advantages and disadvantages of different car body designs.

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 and their independent working practices.

5.2 Course content

• Presentation of the social and political framework conditions in vehicle manufacturing
• Driving resistances
• Car body designs and types of bodywork
• Modern car body materials and light weight construction
• Development load cases, development tools and virtual functional layout
• Aspects of body manufacturing
• Joining techniques in body engineering

→ 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 materials are used to build cars? How do you go about designing a car body? After exploring existing solutions to these questions, you contemplate the potential for development in vehicle construction.

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.)

Chemistry for Process Engineers

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Chemie für Anlagentechniker / Chemistry for Process Engineers**	1.2 Short description (optional)	1.3 Module code (from HIO) **CIW.1.0088**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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**	**150**	**5**
	Exercise	**1**	**15**		
	Practical course – in the form of a block placement outside term time / the examination period	**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, follow-up work				
	preparation for the examination				
	Total		Total non-contact hours **75**		

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 implement the basic concepts and methods in inorganic and physical chemistry. They will be able to identify certain cross-links to materials sciences at appropriate places, and highlight concrete applications.
The practical courses enable students to develop solution strategies for carrying out chemical experiments and analysis. This enables them to transfer theoretical learning content to practice, and to assess the significance and problems of chemical experiments.

5.2 Course content

General Chemistry
Units of measurement, atomic and molecular structure and chemical bonds, periodic table of the elements, application of the law of mass action, chemical equilibrium, acids and bases, oxidation and reduction
Inorganic Chemistry
Chemistry and properties of the main and transition group elements (as examples), hydrogen and its compounds, chemistry of noble gases and of atmospheric trace gases
Physical Chemistry
Ideal gas, chemical material transformations (change of state, reactions), energy turnover during chemical processes (enthalpy, entropy, free enthalpy), activation energy, chemical reaction kinetics
Electrochemistry
Nernst's law, Faraday's laws, electrolysis, batteries and accumulators, fuel cells
Quality assurance
Selected analytical and spectroscopic methods for monitoring 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.

You learn the basic concepts and methods of inorganic and physical chemistry, and discover specific potential applications via cross-connections to materials sciences. You put your knowledge to the test in laboratory classes.

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 or oral examination

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. T. Jüstel

7.3 Professors (optional):

Professor Dr. rer. nat. T. Jüstel

7.4 Maximum number of participants (optional)

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

Recommended reading: C.E. Mortimer, U. Müller, Chemie, Thieme, 8th edition 2003
Manuscript for download: www.fh-muenster.de/juestel

CIM

1	1.1 Title of module (GER / ENG) **CIM**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0019**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**3**
	Mechanical Engineering (dual study)		

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**	**150**	**5**
	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, follow-up work				
	preparation for the examination				
	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 apply and further develop modern, computational methods for the optimal design of production facilities, using the example of the automotive industry. They will be able to identify the methods used in practice to plan, control and simulate production facilities, and to adapt them to concrete issues.

The aim of the practical course is to enable students to expand on their theoretical knowledge on modelling and simulating production facilities, and to independently develop solution methods for tackling practice-oriented assignments.

5.2 Course content

Lecture/exercise class:
- **Planning philosophies**
- **Subtasks**
- **Hierarchical sequential PPC concept (PPC = production planning and control)**
- **Manufacturing resource planning II (MRP II)**
- **Load-oriented order release**
- **Retrograde scheduling**
- **Kanban approach**
- **Optimised production technology (OPT)**
- **Enterprise resource planning**
- **Supply chain management**

Practical course:
- **Modelling, simulation and optimisation of production facilities**

→ 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 makes production plants, e.g. in the automotive industry, functional and efficient? You learn various methods that can be used to plan, control and simulate such plants.

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.)

Closed Loop Control

1	**1.1 Title of module (GER / ENG)** **Regelungstechnik /** **Closed Loop Control**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0105**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**5**
	Computer Science in Mechanical Engineering	**C**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**7**

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**	**150**	**5**
	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, follow-up work, preparation for the 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 recognise and describe the structure and functioning of closed loops. By applying the mathematical methods and techniques they have learned, students will be able to calculate standard closed loops, and to classify the main controller types and methods.
The practical course enables students to expand on and consolidate the specialist knowledge gained in the lectures by transferring the knowledge to practical tasks. In particular, students will be able to measure signals in control loops, set a closed loop in practice, and analyse the effects of incorrect controller settings on system behaviour. The work performed in small groups

resembles the work practices often conducted in engineering practice, and will improve students' communication and team working skills, as well as their capacity for reflection. The use of MatLab-Simulink, a software program widely used in industry, enables students to design closed loops as used in standard engineering practice.

5.2 Course content

Signals and signal flow diagrams; modelling; Laplace transformation; controller and track types; closed loops; stability; control precision; standard methods for setting and optimising controllers. Calculation examples related to the above thematic areas are addressed in the exercise classes. In the practical course, students are divided into small groups to expand on the knowledge gained in practice on test benches.

→ 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.

We encounter closed loop control in our everyday lives wherever machines move or change things automatically. You understand the technical connections behind it, and are able to calculate closed loops.

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.)

Combustion Engines

1	**1.1 Title of module (GER / ENG)** **Verbrennungskraftmaschinen /** **Combustion Engines**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0205**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**5**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)	**C**	**5**

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**	**150**	**5**
	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, follow-up work, written elaboration		**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 related to combustion engines including reciprocating engines and gas turbines. They will able to transfer them into practical engineering applications. In the practical course, the the students can apply their theoretical knowledge in experiments. The work in small groups and the preparation of reports and presentations enhance their communication and social skills, too.

5.2 Course content

- **Introduction and Overview (Classification)**
- **Thermodynamics of Combustion Engines and Cycles**
- **Combustion**
- **Piston Engines (Otto and Diesel Engines)**
- **Performance**
- **Gas Turbines and Jet Engines**
- **Main Components**
- **Performance and Component Matching of Gas Turbeines and Jet Engines**
- **Modern Trends in Combustion Engines**

→ 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.

Those involved professionally with engine technology should understand how reciprocating engines and gas tubrines incuding jet engines work. You therefore explore various designs of these engines, and apply the knowledge gained to practical problems.

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. 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.)

Literature:

Special lecture material and information; Urlaub: Verbrennungsmotoren, Springer; Pischinger: Thermodynamik der Verbrennungskraftmaschine, Springer; Lechner & Seume: Stationäre Gasturbinen, Springer; Bräunling: Flugtriebwerke, Springer; Cumpsty & Heyes: Jet Propulsion, Cambridge

Communication (Prerequisite for Practicle Project)

1	1.1 Title of module (GER / ENG) **Kommunikation / Communication**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0198**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**3**
	Computer Science in Mechanical Engineering	**C**	**3**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**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)	Exercise Communication	**2**	**30**		
	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, follow-up work, preparation for the examination				
	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?)

This course will enable students to deliver specialised presentations and describe their projects and present their group work. They will learn to proficiently apply rhetorical devices, audience-oriented methods and specialist terms in describing and explaining technical processes. In discussions and conversations they train to ask and answer questions respectfully while giving their own opinion in a deliberated and well-argued way. This is complemented by an introduction into preparation techniques based on literature search and specialised documentation, which promotes academic writing across modules. In terms of form and style, proficiency in writing lab reports and e-mails is also part of the course. The

emphasis is on providing students with practice for effective communication, giving them confidence and poise for everyday situations in their studies as well as in a professional context.

5.2 Course content

Using language in a clear and concise manner in writing and speaking, presenting with technical aids and rhetorical skills, arguing and debating, preparing practical exercises and contributing them in class, prompting techniques, conversational skills in a meeting/negotiation situation, literature search and documentation.

→ 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.

Communicating professionally and efficiently is the key to success. It provides a solid foundation for any project. Focusing on methods and training in practical exercises, the goal of this module is proficiency in this important skill.

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)

Passing the final examination, which is a term of admission for starting an industrial placement to write the Bachelor thesis.

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

Semi-public talk based on presentation software (15 minutes + Q & A).

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:

Dean Professor Dr. rer. nat. E. Finke

7.3 Professors (optional):

Lecturer Dr. S. Schiller-Lerg

7.4 Maximum number of participants (optional)

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

Computational Fluid Dynamics

1	**1.1 Title of module (GER / ENG)** **Strömungssimulation /** **Computational Fluid Dynamics**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0121**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1.GS**
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering	**C**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4**
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 assess the strengths and weaknesses of modern computer-assisted methods and, using a current standard CFD program, to calculate and analyse simple technical flow processes.
Following a detailed introduction to the theoretical grounding, students will conduct their own numerical projects using a commercial software package. The methods of calculation learned in the "Basics of Fluid Mechanics" module will be used to verify the results and derive the calculation equations.

The practical course enables students to develop their own simulation models using state-of-the-art software, and to implement CFD projects independently. They will be able to independently develop basic models, define the necessary boundary conditions, and assess the calculation results for plausibility. They will also acquire profound abilities in 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

Foundations of mesh generation, relevant mathematical equations, modelling turbulence, selection of boundary conditions, treatment of walls, multiphase models, the finite difference method (FDM), the finite element method (FEM), the finite volume method (FVM)

→ 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.

Special simulation programs can be used to calculate and assess flow processes. You familiarise yourself with the basics so as to be able to design your own simulation models as part of 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 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.)

Computer Graphics

1	**1.1 Title of module (GER / ENG)** **Computergrafik / Computer Graphics**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **ETI.1.0056**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering	**CE**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	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, follow-up work				
	preparation for the examination				
	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?)

The course introduces students to the computer-assisted creation of images and animations. Students will be familiarised with the processing chain, from model description to the computer-generated image. In the practical course, the relevant models, methods and algorithms involved in the individual steps are applied and implemented as examples.
Students will be able to create 2D and 3D graphics using a computer, enabling them to start generating digital worlds.

5.2 Course content

Foundations:
Properties of graphics, representation of virtual 2D or 3D space, camera (perspective)
Modelling:
Geometric objects, curves, interpolation, splines, areas, volumes, polygons and polyhedrons, data structures, performance
Synthesis:
Perception, rendering, visibility, appearance, surfaces, light
Visualisation:
Scalar data, volumes, vector fields, modelling, data structures
Animation:
Key frames, routes, hierarchies and procedures
Current application programming interfaces and tools, current examples being OpenGL, DirectX and Blender

→ 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 create your own worlds – in virtual and three-dimensional form. First, however, you practise general modelling and familiarise yourself with the main 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: ….)*

Modules Computer Science I and II, Mathematics I, knowledge and confident use of linear algebra, as addressed in the Mathematics I module, participation in the Algorithms and Data Structures module would be advantageous.

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 have participated successfully in the practical course and passed 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 or oral examination, or completion and presentation of a technical project, possibly in combination with achievements from the practical course

6.4 Requirements for admission to examination

Successful participation in the practical course

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.

7.1 Languages used in the module:

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

7.2 Module Contact Person:

Professor Dr. K. Ungru

7.3 Professors (optional):

Professor Dr. K. Ungru

7.4 Maximum number of participants (optional)

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

Recommended reading (selection):

(1) M. Bender, M. Brill: Computergrafik: Ein anwendungsorientiertes Lehrbuch, Hanser, 2nd edition, 2006
(2) A. Nischwitz, M. W. Fischer, P. Haberäcker: Computergrafik und Bildverarbeitung, Vieweg+Teubner, 2nd edition, 2007
(3) H.-P. Gumm, M. Sommer: Einführung in die Informatik, Chapter 11 Grafikprogrammierung, Oldenbourg, 8th edition, 2009
(4) A. Butz, H. Hussmann, R. Malaka: Medieninformatik, Chapter 7: 2D-Grafik, Chapter 8: 3D-Grafik, Pearson,2009
(5) H.-J. Bungartz, M. Griebel,C. Zenger: Einführung in die Computergraphik, 2nd edition, Vieweg, 2002
(6) J.D. Foley, A. Van Dam, S.K. Feiner: Computer Graphics - Principles and Practice, 2nd edition, Addison-Wesley, 1996
(7) A. Watt, M. Watt: Advanced Animation and Rendering Techniques - Theory and Practice, Addison Wesley, 1992

Cross Border Projects

1	**1.1 Title of module (GER / ENG)** **Cross Border Projects**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **ITB.1.0077**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering	**CE**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4**
	Mechanical Engineering (dual study)	**CE**	**4**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	Exercise	**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, follow-up work				
	preparation for the examination				
	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:

- Apply the method of design thinking to different business situations and technical challenges
- explain the technical know-how required to solve the problem in theory and transfer it into practice to solve the problem
- demonstrate active listening, empathy and effective interaction with people from other cultures
- take in, pass on and understand information in English at an advanced level
- successfully present an idea in English to a group

5.2 Course content

The Cross Border Project (CBP) is carried out as a Blended Intensive Programme (BIP) with students and lecturers from currently three participating European universities (SeAMK Seinäjoki University of Applied Sciences (Finland), Thomas More University of Applied Sciences (Belgium) and the FH Münster University of Applied Sciences). Together, they work on complex technical problems that change every year. To solve these problems, agile methods such as design thinking are taught as well as technical and intercultural knowledge. The seminar takes place in a hybrid format of virtual meetings and a one-week attendance phase at one of the participating partner universities

→ 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 Cross Border Project (CBP) is a collaborative engineering program among three European universities (Finland, Belgium, and Germany). It focuses on agile methodologies, intercultural competence, and technical problem-solving in a hybrid format and a one-week physical exchange.

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 participate in the module, contact the module leader

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 in the form of a portfolio

6.4 Requirements for admission to examination

Regular active participation at the seminar

6.5 Module mark weighting for calculating final grade

*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.

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

7.1 Languages used in the module:

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

7.2 Module Contact Person:

Dr. Andreas Hövener

7.3 Professors (optional):

Dr. Andreas Hövener

7.4 Maximum number of participants (optional)

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

Database Systems

1	1.1 Title of module (GER / ENG) **Datenbanksysteme / Database Systems**		1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0022**
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:
	Bachelor`s programmes:			
	Mechanical Engineering - International Engineering (Outgoings)			
	Mechanical Engineering - International Engineering (Incomings)		**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering		**CE**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		**CE**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		**CE**	**5**
	Computer Science in Mechanical Engineering		**C**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering			
	Mechanical Engineering (dual study)		**CE**	**WiSe**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	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, follow-up work				
	preparation for the examination				
	Total		Total non-contact hours **75**		

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 model and design databases. They will also be able to assess integration in heterogeneous application landscapes.
The practical course and the integrated project work enable 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.

5.2 Course content

Data structures, file systems, forms of data retention, decoupling from physical and logical data retention, concept of three-level architecture, relational databases, relational algebra, operations on relations, structured query language (SQL), relational database management systems, process analysis, entity relationship diagrams, implementation of databases, systems integration, client/server architectures, 3GL programming, linking relational databases to the internet, LAMP/WAMP systems.
This course involves students carrying out a project to design and implement a database (including a user application).
→ 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 databases, and how are they organised? You find the answers by designing a database and embedding it in an IT application landscape as part of a project.

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 associated elaborations

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 from the lecture

Design Engineering / CAD 1

1	**1.1 Title of module (GER / ENG)** **Konstruktion / CAD 1 /** **Design Engineering / CAD 1**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0076**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**3**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**3**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**3**
	Mechanical Engineering (dual study)	**C**	**5**

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**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 the machine elements covered to suit design tasks and dimension them reliably. As a result of the skills developed, students have a basic understanding of how to deal with standards and guidelines and have fundamental knowledge of material behavior as a function of operating conditions and can incorporate this knowledge into strength design. Students are able to apply basic design rules in the design of machine elements and are able to select machine elements and combine them to form complex assemblies. In addition, they are able to apply their developed skills to engineering problems, to develop and execute mechanical engineering designs independently or in a team with other experts.
The practical course enables students to deepen and consolidate the acquired technical knowledge by transferring it to practical tasks. In addition, working in small groups resembles the frequent way of working in engineering practice and improves the students' communication, teamwork and reflection skills.

5.2 Course content

Exploration of:
- **Shaft-hub connections**
- **Seals**
- **Tribology (basics)**
- **Rolling bearings and rolling bearing arrangements**
- **Plain bearings**
- **Gear drives (basics)**
- **Spur gears with involute gearing**

→ 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 aim of the lectures and exercises in this module is to make a significant contribu-tion to engineering education by imparting technical and methodological knowledge as well as skills and abilities for developing and designing technical products.

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. 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.)

Design Engineering / CAD 2

1	**1.1 Title of module (GER / ENG)** **Konstruktion / CAD 2 /** **Design Engineering / CAD 2**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0077**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**4**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**6**

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**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 analyze and classify the functions and operating principles of the machine elements covered in the overall context of machine systems. They acquire a comprehensive understand-ing and basic knowledge of the machine elements covered as well as their design characteristics and technical representation. Students will be familiar with the tools and technical standards required for design and will be able to recognize basic technical relationships in machine design as well as systematically analyze the func-tion and stress of machine elements in technical systems.

The practical course enables the students to deepen and consolidate the acquired technical knowledge by transferring it to practical tasks. In addition, working in small groups resembles the frequent way of working in engineering practice and improves the students' communication, teamwork and reflection skills.

5.2 Course content

Exploration of:
- **Springs**
- **Clutches and brakes**
- **Belt transmission**
- **Chain gear**
- **Worm gear**
- **Planetary gear**
- **Cost calculation according to VDI 2225**

→ 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 aim of the lectures and exercises in this module is to make a significant contribution to engineering education by imparting technical and methodological knowledge as well as skills and abilities for developing and designing technical products.

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. 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.)

Digital Manufacturing

1	1.1 Title of module (GER / ENG) **Digitale Produktion / Digital Manufacturing**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0196**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**5**
	Computer Science in Mechanical Engineering	**CE**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)	**C**	**7**

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**	**150**	**5**
	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, follow-up work		**90**		
	written elaboration, presentation				
	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 have the following capabilities:

Professional expertise:

- **Know and be able to apply the creation of product data and the field of production planning and control systems.**
- **Be able to classify simulation tools of manufacturing processes and use them correctly.**
- **Understanding the necessary input parameters and be able to analyze and evaluate the potentials and limits of digital planning and simulation tools.**
- **Ability to decide under which conditions the use of digital planning and simulation tools makes sense.**
- **Being able to use selected tools of the digital factory on plain examples.**
- **Know and be able to utilize the possibilities of the Internet of Things in the manufacturing environment**
- **Creation of simple programs to solve problems from the production environment**

Methodological competence:

- **Carry out an independent analysis and structuring of production-related issues**
- **Be able to prepare and execute digital planning and simulation applications**
- **Analyze the results of digital planning and simulation tools and have the ability to transfer them for problem solving**
- **Systematic decision-making from a technological, economic and ecological point of view**
- **Systematically analyze complex problems with regard to digital production data**
- **Combine solutions for partial tasks within the overall system to form an overall solution**
- **Systematically understand and classify the opportunities and limits of the simulation methods used**

Self-competence:

- **Independent analysis and structuring of manufacturing technology and production engineering issues**
- **Critical handling of the possibilities of innovative digital planning and simulation tools**
- **Systematic approach to process method selection**
- **Get actively involved in small teams and work out solutions together**
- **Learning of teamwork for joint processing of simulation projects**
- **Discuss and present the solution results**

5.2 Course content

- **Product development process and digital production processes**
- **Tasks and goals of production process planning in an industrial company**
- **Specific requirements for manufacturing and assembly processes**
- **Definition and objectives of the "digital factory"; Overview of tools in the digital factory**
- **Introduction to the Industrial Internet of Things (IoT) and Industry 4.0, product data management (PDM) and ERP systems and machine learning**
- **Approaches to VR, AR in production and assembly systems**
- **Assembly simulation, accessibility analyzes**
- **The exercises comprise:**
- **Implementation of examples with tools from the digital factory, creation of programs for selected standard problems taken from the production environment, Implementation of a digital process environment for manufacturing and assembly 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.

Production processes – from a single screw to a complete aircraft – are usually complicated. In this module, you learn about digital tools, which assist you in planning and simulation processes.

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.)

Digitalisation in Mechanical Engineering

1	**1.1 Title of module (GER / ENG)** **Digitalisierung im Maschinenbau /** **Digitalisation in Mechanical Engineering**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0145**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering	**CE**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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)	Seminaristic Lecture	**3**	**45**	**150**	**5**
	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, follow-up work				
	preparation for the examination				
	Total		Total non-contact hours **75**		

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 recognise and describe the current trends in digitalisation. They will also be able to identify the opportunities arising from digitalisation for mechanical engineering, and to develop new ideas accordingly. To ensure the efficient implementation of these ideas, students will be able to use a wide range of specific tools and methods. They will be made aware of the need to work together on an interdisciplinary basis with computer scientists and business economists, and will be able to apply the necessary specialist vocabulary. By tackling case studies in small groups, students will be able to train their team working and communication skills.

5.2 Course content

• Motivation and status quo with regard to developments in mechanical engineering
• Basic concepts of digitalisation (general fields of application (horizontal) and components (vertical), big players in the digital business)
• Principles of digitalisation and comparison to traditional mechanical engineering
• Potential offered by digitalisation in mechanical engineering and process engineering (including examples)
• Foundations of mechanics and physics with regard to the "digital fingerprint" of machinery
• Measurement technology, focusing on vibration analysis (including smartphones)
• Applications, options and toolboxes for digitalisation (including examples)
• Master data with a particular focus on digitalisation
• Digital transformation in companies (ERP systems, case study)
• Structure and functionality of expert systems for mechanical engineering
• Foundations of machine learning, focusing on neural networks
• Basics of the General Data Protection Regulation

→ 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 modul "Digitalization in Mechanical Engineering" delivers the knowledge to improve skills and competitiveness by focusing on digital mechanical fingerprints, digital twins, big data, master data and utilizing arifical intelligence

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. M. Brockmann

7.3 Professors (optional):

Lecturer Dipl.-Ing. W. Mackel

7.4 Maximum number of participants (optional)

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

Dynamics

1	1.1 Title of module (GER / ENG) **Dynamik / Dynamics**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0025**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**4**
	Mechanical Engineering - International Engineering (Incomings)	**C**	**1.GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**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**	**150**	**5**
	Exercise	**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, follow-up work				
	preparation for the examination				
	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 demonstrate the basic methodological approach for solving dynamic problems. They will be able to determine position, velocity and acceleration vectors for mass points and for random points on rigid bodies in plane motion. They will be able to investigate the interaction between the motion of a body and the action of force on that body using the fundamental law of dynamics, the energy theorem and law of conservation of energy, or the principle of linear and angular momentum. Students will be able to derive abstract mechanical models from practice-related problems of mechanical engineering, and to interpret and critically assess their own results.

The specialist solution strategies gained are the basis for understanding advanced study elements, and can be transferred to related engineering subjects such as machine elements, construction design and gear technology. In addition, the solution strategies are an essential precondition for enabling students to determine motion sequences in machinery in their later professional environment and to create products that meet kinematic and kinetic requirements.

5.2 Course content

• Kinematics of the mass point
• Kinetics of the mass point
• Kinematics of a rigid body in plane motion
• Relative kinematics
• Kinetics of a rigid body in plane motion
• Kinetics of the point mass system
• Impact laws
• Oscillations with one degree of freedom

→ 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 "Statics and Strength of Materials" module, you learn further terms and methods from the field of dynamic processes. This thorough knowledge of mechanical interrelations makes it easier for you to understand subsequent modules.

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. 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;
Dankert, H.; Dankert, J.: Technische Mechanik, Teubner Verlag

Electrical Engineering in Vehicle Construction

1	**1.1 Title of module (GER / ENG)** **Elektrotechnik im Fahrzeugbau /** **Electrical Engineering in Vehicle Construction**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0183**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology (General Mechanical Engineering)	**CE**	**4**
	Computer Science in Mechanical Engineering	**CE**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4**
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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**	**150**	**5**
	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, follow-up work				
	preparation for the examination				
	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 demonstrate different possibilities for the use of electronic circuits in the manufacture and operation of vehicles. Students will be able to design simple electronic circuits and implement them in practice. They will be able to simulate electronic circuits using the LTspice program system and to develop simple applications in assembler code using the Atmel Studio program system.
The practical course enables students to expand on and consolidate the theoretical specialist knowledge gained in the lectures by transferring the knowledge to practical applications. As part of

the practical course, experiments selected by the students, involving different active and passive electronic elements in different circuits, are prepared, conducted and evaluated. During the practical course, students will gain basic knowledge that may be required in order to apply the electronic circuits under investigation to advanced areas of application.
In the field of engineering, the ability to familiarise oneself with unfamiliar thematic areas is an important professional basis for being able to bring in new ideas and input to the continuously evolving fields of technology.

5.2 Course content

Lecture:

- **Semiconductor electronics**
- **Sensor technology**
- **Automotive electronics**
- **Microcontrollers**

Exercise class:

- **Calculation and programming examples**

Practical course:

- **Diodes, transistors**
- **Operational amplifiers (OPV)**
- **Timers, decade counters**
- **Microcontrollers**
- **LTspice**
- **Atmel Studio**

→ 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 influence of electrical engineering is constantly increasing in both the production and operation of vehicles. You will learn about various possibilities for using electronic circuits. Furthermore, you will be able to design and practically implement simple electronic circuits.

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.)

Energy Systems Technology II - Hydrogen

1	**1.1 Title of module (GER / ENG)** **Energietechnik II – Wasserstoff /** **Energy Systems Technology II - Hydrogen**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **EGU.1.0274**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4**
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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**	**150**	**5**
	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, follow-up work, preparation for the 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 have the specialist knowledge required to plan and operate hydrogen plants for the purpose of providing hydrogen as a basic material for industry and as a source of energy for energy supply

5.2 Course content

Physical and chemical properties of hydrogen, material behaviour under the influence of hydrogen, production of hydrogen, safety in handling hydrogen, technology paths for the future use of hydrogen, methods of producing hydrogen, transport, storage and distribution of hydrogen, the use of hydrogen

→ 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: ….)*

Foundations of Thermodynamics and Materials Science

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 or oral examination

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. T. Schmidt

7.3 Professors (optional):

Professor Dr.-Ing. T. Schmidt

7.4 Maximum number of participants (optional)

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

Energy and Resource Efficiency

1	1.1 Title of module (GER / ENG) **Energie- und Ressourceneffizienz / Energy and Resource Efficiency**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0203**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C / CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**5**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	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, follow-up work		**90**		
	written elaboration, presentation				
	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 describe technical processes regarding mass and energy flow. They can choose and evaluate different methods for assessing sustainability of products and processes. The students can judge the energy and resource efficiency of different technical applications. In addition, students will be able to independently generate, analyse, assess and present experimental data in the context of experiments.
The module content enables students to perform efficiency assessments based on technical and methodical understanding and to contextualize them into technical and social background.

5.2 Course content

- **introduction to energy and resource efficiency**
- **methods and key figures for assessing sustainability**
- **balancing energy and mass flow**
- **renewable energies and energy storage**
- **measures for improvement of energy efficiency**
- **hydrogen technology**
- **basics and selected technologies of recycling**

→ 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 get to know the basics of energy efficiency, renewable energies and resource technologies in order to assess different technologies concerning 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: ….)*

Thermodynamics and Fluid 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:

Prof. Dr.-Ing. J. Scholz

7.3 Professors (optional):

Prof. Dr.-Ing. J. Scholz

7.4 Maximum number of participants (optional)

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

Literature:
Accompanying material to the lecture
Klöpffer / Grahl: Ökobilanz (LCA), Verlag Wiley-VCH, 2009
Watter: Regenerative Energiesysteme, Springer-Verlag, 2019
Martens: Recyclingtechnik, Spektrum-Verlag, 2011

Engineering for Power Generation

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Energietechnik /** **Engineering for Power Generation**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0029**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology (General Mechanical Engineering)	**CE**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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**	**150**	**5**
	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, follow-up work				
	preparation for the examination				
	Total		Total non-contact hours **60**		

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 transfer problems from the field of power engineering to technical issues and applications. In particular, they will be able to understand and assess the different technical designs of thermal power plants. Students will be able to solve special tasks related to the design of thermal power plant processes and components. The practical course enables students to transfer the specialist knowledge gained to tasks relating to the experimental investigation of energy systems. 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

• Energy management data and interrelations
• Basics of heat engineering
• Structure of steam power plants
• Boilers and steam generators
• Power plants on the basis of gas turbines
• Design of power plant components
• Nuclear power plants
• Combined heat and power plants
• New energy systems and concepts

→ 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:

Professor Dr.-Ing. habil. S. a. d. Wiesche

7.3 Professors (optional):

Professor Dr.-Ing. habil. S. a. d. Wiesche

7.4 Maximum number of participants (optional)

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

K. Strauß: Kraftwerkstechnik. Springer, Berlin, 2007

Fluid Machines

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Strömungsmaschinen / Fluid Machines**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0119**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology (General Mechanical Engineering)	**C**	**5**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**7**

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**	**150**	**5**
	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, follow-up work, preparation for the 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 apply the basics acquired in the foundation lecture on "Fluid Mechanics" to various types of turbomachines. They will be able to recognise and argue on the key fluid flow phenomena in concrete applicable cases. In addition, they will be capable of independently addressing fundamental questions with regard to the selection and design of machines, applying the main laws of transfer, and comparatively assessing control methods.
The practical course enables students to build on the specialist knowledge gained in the lectures, compare the main control methods, use experimental setups for specific experiments, and handle electronic measuring instruments. They will also have the profound skills required to follow up experiments, i.e. 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

Energy conversion, model laws, characteristics, characteristic diagrams, cavitation, centrifugal pumps, ventilators, blowers, compressors

→ 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:

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.)

Fluid Machines and Computational Fluid Dynamics

1	1.1 Title of module (GER / ENG) **Strömungsmaschinen und CFD / Fluid Machines and Computational Fluid Dynamics**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0204**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C / CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4**
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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**	**150**	**5**
	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, follow-up work, preparation for the 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, the students are able to apply the basics acquired in the basic lecture "Fluid Mechanics" to different representatives of fluid machines. Furthermore, they are able to work out fundamental questions on machine selection and design themselves, to apply the most important similarity laws and to evaluate control methods comparatively. Furthermore, they are able to transfer the knowledge of fluid mechanics acquired in the basic module to simple examples in the field of flow simulation, to understand modelling limits as well as possible sources of error and thus to assess the resilience of numerical solution approaches.

The fluid mechanics practical course enables the students to apply the specialist knowledge acquired in the lecture, to compare the most important control methods, to use experimental set-ups for targeted experiments and to handle electronic measuring devices. The CFD practical course enables the students to build their own simulation models and to carry out CFD projects independently. They are able to create basic models themselves, define the necessary boundary conditions and evaluate the calculation results for plausibility.
In both parts of the practical course, the students acquire in-depth skills in the post-processing of the experiments or the computational data preparation, the extraction of essential variables and, in particular, the complete and clearly structured documentation and presentation.

5.2 Course content

Fluid Machinery:
Energy conversion, similarity laws, key figures, characteristic diagrams, centrifugal pumps, fans, blowers, compressors.

Flow simulation:
Fundamentals of mesh generation, mathematical equations used, modelling of turbulence, choice of boundary conditions, wall treatment, multiphase models, discretisation approaches (FDM, FEM, FVM).

→ 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 are already familiar with the basics of fluid mechanics. Now, using specific case studies and a variety of fluid flow machines, you show your ability to assign and apply key fluid flow phenomena to suit the situation at hand.

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):

Dr. Sven Annas

7.4 Maximum number of participants (optional)

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

Fluid Mechanics

1	**1.1 Title of module (GER / ENG)** **Strömungslehre /** **Fluid Mechanics**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0116**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**3**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**3**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**5**

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**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 and calculate simple fluid flow issues. They will be able to apply basic calculation methods to application examples, and to assess and mathematically analyse the behaviour of inviscid and viscous flow processes.
The practical course enables students to conduct experiments under instruction, and to operate and calibrate experimental setups and electronic measuring instruments. They will also be able to conduct experiments in group work and to conclusively follow them up. 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

Surface tension phenomena, inviscid flows (Bernoulli's equation), viscous flows, (momentum equation), boundary layer flows, flows through pipework systems, buoyancy and flow resistance to 3D bodies, supersonic flows, flow measurement technology, flow visualisation, 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.

What makes aeroplanes fly? What is a sonic boom? You understand these and other fundamental phenomena of fluid mechanics. You then use various experiments in the lab to test your new knowledge in practice.

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.)

Fundamentals of Agricultural Engineering

1	**1.1 Title of module (GER / ENG)** **Grundlagen der Landtechnik /** **Fundamentals of Agricultural Engineering**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0051**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4**
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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)	Seminaristic Lecture	**3**	**45**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 the appropriate tools and machinery for getting the work done according to the intended purpose for a variety of agricultural production and process steps. In their future career, they will therefore be able to explain the functioning and application limits of the equipment addressed, and to independently formulate proposals for the selection and setting of machinery on this basis. The practical courses enable students to practice the options for setting devices and machines using a selection of examples. In this way, their capacity for teamwork and ability to present results to suit the target group are actively promoted.

5.2 Course content

• Fundamentals of tractor engineering
• Tillage devices
• Agricultural transportation
• Cultivation and sowing technology
• Self-propelled harvesters

→ 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 gain an overview of appropriate tools and machinery for a variety of agricultural work processes. In your future career, you can then independently formulate proposals for the selection and adaptation of such 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.)

Heat and Mass Transfer

1	**1.1 Title of module (GER / ENG)** **Wärme- und Stoffübertragung /** **Heat and Mass Transfer**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0141**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C / CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	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, follow-up work, written elaboration		**75**		
	Total		Total non-contact hours **75**		

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 transfer problems from the field of heat and mass transfer to technical issues and applications. In particular, they will be able to understand and assess the different technical designs of heat transmitters. Students will be able to determine heat transfer coefficients, and to use them to solve design issues. The practical course enables students to transfer the specialist knowledge gained to tasks related to the experimental investigation of heat transmitters. 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 target-oriented presentation of experiment results.

5.2 Course content

• Mechanisms of heat and mass transfer, and basic concepts
• Heat conduction and radiation
• Thermodynamic design of heat transferring devices
• Convective heat transfer
• Heat transfer with phase change
• Selected 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.

A water-cooled engine is an example of heat and mass transfer. You take a closer look at the mechanisms and technical systems used for this. By the end of the course, you'll be able to find your own technical solutions to specific practical problems.

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. a. d. Wiesche

7.3 Professors (optional):

Professor Dr.-Ing. habil. S. a. d. Wiesche

7.4 Maximum number of participants (optional)

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

Baehr, Stephan: Wärmeübertragung. Springer, 1996
Lienhard & Lienhard: A Heat Transfer Textbook. Dover, New York, 2010

Hydraulics

1	**1.1 Title of module (GER / ENG)** **Hydraulik / Hydraulics**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0057**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**4**
	Mechanical Engineering - International Engineering (Incomings)	**C**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**4**
	Computer Science in Mechanical Engineering	**CE**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**6**

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**	**150**	**5**
	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, follow-up work, preparation for the 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 name the components of a hydraulic system, describe how these components interact, and outline the entire functioning of a hydraulic system. In addition, they will be able to read hydraulic schematics, i.e. identify the components presented and derive the functioning of the system, as well as create such schematics independently and in conformity with standards. Students will be able to independently design simple hydraulic systems, and to calculate and design the main components.

The practical course enables students to expand on and consolidate the specialist knowledge gained in the lectures by transferring the knowledge to practical applications. In particular, students will be able to carry out series of measurements without assistance, and to independently perform troubleshooting using testing stands. The work performed in small groups resembles the work practices often conducted in engineering practice, and will improve students' communication and team working skills, as well as their capacity for reflection.

5.2 Course content

- **Introduction: applications, hydraulic circuit symbols**
- **Physical foundations of hydrostatics**
- **Physical properties of real pressurised fluids**
- **Components: pressurised fluids, pumps, motors, cylinders, directional valves, pressure valves, flow control valves, check valves**
- **Hydrostatic gearboxes**
- **Hydrostatic systems**
- **Hydraulic circuits and schematics**

In the exercise classes, knowledge is applied to practical problems (e.g. calculating forces, flow rates, pressure, power; designing hydraulic components and systems).
Laboratory class experiments are carried out in small groups.
→ 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 mechanical engineering, hydraulics is about the transmission of large forces through a fluid, usually oil. You learn to describe hydraulic systems, e.g. construction machinery, and read circuit diagrams, and produce your own designs.

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.)

Innovative Materials

1	1.1 Title of module (GER / ENG) **Innovative Werkstoffe / Innovative Materials**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0059**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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)	Seminaristic Lecture	**3**	**45**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 assess innovative materials, focusing on light construction in the tribological context, and to determine technical applications accordingly. They will be able to evaluate innovative materials with regard to the mechanical stresses occurring, and to assess the resulting overall systems in terms of aspects such as life cycle costing and energy efficiency. The objective is to ensure that students will be able to meet the real-life demands of working life in the area of innovative materials.

The practical courses enable students to structure and interpret the results generated from material tests, and to drive the introduction and application of innovative materials with adequate commitment. In addition, students will learn to develop and apply solution strategies for the set tasks, building on the specialist knowledge gained in the lectures, and to formulate and present the results to suit the target group. This also enables students to expand on their practical experience and to handle the necessary metrology. They will also gain an entrepreneurial understanding during the practical implementation of the topic of "innovative materials" in a company. Social skills are strengthened by working in groups.

5.2 Course content

Selected trends in mechanical engineering, using the example of light construction (material and energy efficiency) and tribology (reduction of friction and wear, zero emissions)
Innovative materials from the area of
- Light construction (light metals, fibre composites, high-strength metals)
- Tribology (wear-reducing coatings, dry-run capable materials, in particular plastics)
Design and calculation of lightweight structures
Assessment of a tribological system
→ 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 this course students can learn more about lightweight materials and criteria and function for application in industrial surrounding. Over this aspect of tribology and wear will also be discussed. The students should be able to select materials for special applications in industry.

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 (including a practical exercise in the form of literature search / analysis of the literature and a practical part in the form of a field trip)

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. G. Gevelmann

7.3 Professors (optional):

Professor Dr.-Ing. G. Gevelmann

7.4 Maximum number of participants (optional)

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

Introduction to Computer Science

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Informations- u. Prozessdatenverarbeitung / Introduction to Computer Science**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0058**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology (General Mechanical Engineering)	**C**	**4**
	Computer Science in Mechanical Engineering	**C**	**2**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**2**
	Mechanical Engineering (dual study)	**C**	**4**

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**	**150**	**5**
	Exercise	**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, follow-up work, preparation for the 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 prepare content taught in the areas of

- **Data representation**
- **Information backup**
- **Information storage**
- **Information transmission**
- **Information procurement**

and to reproduce and apply the content in set examination tasks. In addition to understanding the specialist content, students will particularly be able to grasp computer science in its entirety (knowledge triangle of the basics of computer science, applied computer science, and programming languages). Students use this module as an indicator of their learning speed and of their ability to familiarise themselves with unfamiliar subject matter and to reproduce the knowledge gained. In the field of engineering, the ability to quickly familiarise oneself with unfamiliar thematic areas is an important professional basis for being able to survive in the continuously evolving market. This is even surpassed by the ever-increasing rate of change of software in the field of information technology.

5.2 Course content

- **Data encoding**
  - > **Number systems**
  - > **Character encoding**
  - > **Encoding of complex data (graphics, documents, audio, ...)**
- **Information backup procedures** > **parity, ECC, CRC, check digits**
  - > **Encryption and digital signature**
- **Information storage from the L1 cache to WAN-based tape systems**
- **Information transmission**
  - > **Interfaces, networks, protocols**
- **Information processing**
  - > **Automation of sequences with scripting and macro languages**

→ 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 learn the basic thematic areas of computer science: information backup, storage and transmission, as well as applications and programming languages. You recognise the connections and develop a comprehensive idea of this discipline.

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. M. Thiel

7.3 Professors (optional):

Professor Dr.-Ing. M. Thiel, Lecturer

7.4 Maximum number of participants (optional)

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

Introduction to Computer Science

1	**1.1 Title of module (GER / ENG)** **Informationsverarbeitung /** **Introduction to Computer Science**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0197**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering	**C**	**2**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**4**
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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**	**150**	**5**
	Exercise	**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, follow-up work, preparation for the 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 are able to reproduce the content
from the following areas

- **Representation of information**
- **Information security**
- **Information storage**
- **transfer of information**

- **Information gathering**

and apply the acquired knowlegde to problems and tasks.

The students use this module as an indicator of their learning speed and their ability to familiarize themselves with unfamiliar stuff and to reproduce this acquired knowledge. This capability to familiarize oneself with unknown subject areas as quickly as possible is an important professional basis in mechanical engineering in order to be able to survive in the constantly evolving market. This challenge represents an increasing success factor and is significantly influenced by the steadily increasing rate of technological change in the IT area.

5.2 Course content

- **Information coding, character coding, coding of graphics**
- **Binary algorithms**
- **Number systems**
- **Information safety procedures**
- **Redundancy: parity, ECC, CRC, check digits**
- **Encryption and digital signature**
- **Storage (HDD / SDD)**
- **Networks: interfaces, protocols**

→ 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 learn the basic thematic areas of computer science: information backup, storage and transmission, as well as applications and programming languages. You recognise the connections and develop a comprehensive idea of this discipline.

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. Thiel

7.3 Professors (optional):

Prof. Dr.-Ing. M. Thiel / Lecturer

7.4 Maximum number of participants (optional)

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

Introduction to Digital Electronics

1	**1.1 Title of module (GER / ENG)** **Digitaltechnik /** **Introduction to Digital Electronics**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0024**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering	**C**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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**	**150**	**5**
	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, follow-up work				
	preparation for the examination				
	Total		Total non-contact hours **75**		

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 simplify circuit logic, and to implement circuit logic in logic gates. In addition, they will create real circuits that are assessed in terms of their actual transmission behaviour in the component, and optimised as required. Students will also be able to evaluate existing circuits, creating the basis for detecting weak points and for designing improvements.
The practical course enables students to independently solve practice-related tasks for programming digital systems. The use of a standard and general-purpose single-board computer gives students a large amount of freedom in finding a solution, promoting, among other things, their creativity and solution-oriented thinking. Armed with these skills, students will, for instance, be able to construct and optimise control systems of mechanical systems.

5.2 Course content

Lecture/exercise class:
- **Coding and number systems**
- **Boolean algebra**
- **Behaviour of logic gates**
- **Circuitry**
- **Combinatorial circuits**
- **Synchronous and asynchronous sequential circuits**

Practical course:
- **Working with a Raspberry Pi**

→ 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 are familiar with the concepts of "on" and "off" from simple light switches. Such circuits, and others like them, also exist in digital systems. You get to know simple variants, and practise building them yourself.

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.)

Introduction to Digital Electronics and Programmable Logic Control

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	**1.1 Title of module (GER / ENG)** **Digitaltechnik und Steuerungstechnik / Introduction to Digital Electronics and Programmable Logic Control**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0023**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering	**C**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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+2**	**60**	**300**	**10**
	Exercise	**1+1**	**30**		
	Practical course	**1+1**	**30**		
	Total	Total contact hours in SWS	Total contact hours in hours **120**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation, follow-up work				
	preparation for the examination				
	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 of the module, students will be able to explain how control systems function and illustrate the functionality of digital systems in the combination of hardware and software. They will be able to apply theoretical knowledge on program structure when programming different sequences on a PLC and when tackling a variety of examples on the Raspberry Pi single-board computer.
The practical course enables students to expand on and transfer the specialist knowledge gained on the structure of programs by conducting PLC sequence programming and by implementing practice-oriented Raspberry Pi projects. By independently developing the programs and by detecting and

eliminating occurring errors, students particularly practise their problem-solving skills and solution orientation. In addition, by working in small groups, students are able to improve their capacity for teamwork and their communication skills.
The specialist knowledge gained is the basis for working with automated processes, an increasingly important aspect in current engineering practice.

5.2 Course content

Digital engineering:
- **Lecture/exercise class: Coding and number systems, Boolean algebra, behaviour of logic gates, circuitry, combinatorial circuits, synchronous and asynchronous sequential circuits**
- **Practical course: Working with a Raspberry Pi**

Control engineering:
- **Lecture: Introduction, Boolean algebra, control components, implementation of sequence control, programming PLCs**
- **Exercise class: Calculation and programming examples**
- **Practical course: Programming PLCs in small groups**

→ 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:

Professor Dr.-Ing. A. Komainda, Professor Dr.-Ing. D. Scholz

7.3 Professors (optional):

Professor Dr.-Ing. A. Komainda, 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.)

Introduction to Electrical Engineering

1	**1.1 Title of module (GER / ENG)** **Elektrotechnik /** **Introduction to Electrical Engineering**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0028**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**3**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**3**
	Computer Science in Mechanical Engineering	**C**	**3**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**3**
	Mechanical Engineering (dual study)	**C**	**5**

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**	**150**	**5**
	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, follow-up work				
	preparation for the examination				
	Total		Total non-contact hours **75**		

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 demonstrate the basic methodological approach for solving electrical engineering problems. They will be able to investigate linear passive AC and DC networks using Ohm's law and Kirchhoff's laws. They will have the ability to present fundamental interactions between the electric field and the magnetic field, and will be able to apply their knowledge to simple problems such as plate capacitors and electromagnets. They will be able to describe how three-phase alternating current functions.
The practical course enables students to develop and apply solution strategies for the set tasks in a team, building on the specialist knowledge gained in the lectures, and to present and introduce the results to suit the target group. Students will be able to handle the devices commonly used to examine

electrical engineering issues – multimeters, laboratory power supply units, function generators and oscilloscopes, make the necessary settings, and also to assess the possible applications of these devices. Electrical engineering experiments selected by the students, involving different passive elements in different circuits and electrical circuits, are prepared, conducted and evaluated in the practical course. During the practical course, students will acquire the basic knowledge that may be required to use the above devices in other courses or practical courses and to prepare projects and dissertations.
The specialist knowledge gained is the basis for understanding advanced study elements, and can be transferred to related engineering subjects such as instrumentation and control.

5.2 Course content

- **Ohm's law**
- **Kirchhoff's laws**
- **DC networks**
- **Electric field, capacitors**
- **Magnetic field, ferromagnetism, induction**
- **AC circuits**
- **Introduction to three-phase alternating current**

→ 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.

Energy and signals are transmitted electrically. That is why electrical engineering has a firm place in mechanical engineering. You will learn about their most important areas of application and methods.

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, lecturer on the degree programme in Mechanical Engineering – dual study - J. Fricke

7.4 Maximum number of participants (optional)

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

Recommended reading:
Lecture notes;
Hagmann, G.: Grundlagen der Elektrotechnik, Aula Verlag;
Hagmann, G.: Aufgabensammlung zu Grundlagen der Elektrotechnik, Aula Verlag

Introduction to Finite Element Methods

1	1.1 Title of module (GER / ENG) **Grundzüge der FEM / Introduction to Finite Element Methods**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0056**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**4**
	Mechanical Engineering - International Engineering (Incomings)	**C**	**1.GS**
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**4**
	Computer Science in Mechanical Engineering	**C**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4**
	Mechanical Engineering (dual study)	**C**	**8**

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**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 create linear finite element analysis simulations for single statically loaded components by means of both linear algebra and 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, students will learn to create element stiffness matrices for structural and volume elements, as well as overall stiffness matrices. Using the functional approach, they will be able to develop element stiffness matrices and generate corresponding load vectors.

Students will also be able to analyse and assess boundary conditions and FEM meshes, and to establish appropriate meshes and boundary conditions as well as develop meshing strategies for new issues. Students will be able to classify different types of elements (1D, 2D, 3D, RBE) and to specifically use them in FEM models. They will be able to express the difference between the h-method and the p-method, and to select the correct method for the issue at hand. Students will also understand effects such as locking and zero-energy modes, and will be able to assess these effects.
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. Specifically, students will be able to use the Siemens NX program package, comprising the pre- and post-processor and the NASTRAN solver, to investigate and solve linear issues that are to be processed using different types of elements (structural and volume elements). Students will be able to analyse and assess the simulation results. They will also be able to draw conclusions for the construction design, which is the standard process when involved later in engineering practice in the field of construction design and product development.

5.2 Course content

- **Basic idea and principles of FEM**
- **Alternative methods to FEM**
- **Foundations of classical mechanics**
- **Description of problems concerning mechanics of materials as the starting point of FEM**
- **Beam elements, bar elements**
- **Disk elements, plate elements, shell elements**
- **Continuum elements**
- **Meshing and element selection**
- **Boundary conditions**
- **Application of the Siemens NX program package (pre- and post-processor NX and the NASTRAN solver) to linear issues for solving problems with different types of elements**

→ 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.

Technical components are subject to all kinds of loads, which you simulate before they are deployed. A modern approach is the finite element method (FEM), which you are able to understand mathematically and apply practically in a simulation program.

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

Introduction to Fluid Mechanics

(Module **not** valid for enrolment from WiSe 21/22 onwards)

	1.1 Title of module (GER / ENG)	1.2 Short description (optional)	1.3 Module code (from HIO)
1	**Grundlagen der Strömungslehre / Introduction to Fluid Mechanics**		**MB.1.0053**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering	**C**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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**	**150**	**5**
	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, follow-up work, preparation for the 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 analyse and calculate simple fluid flow issues. They will be able to apply basic calculation methods to application examples, and to assess and mathematically analyse the behaviour of inviscid and viscous flow processes. They will have the ability to check the plausibility of the results calculated in the "Computational Fluid Dynamics" module.

5.2 Course content

Surface tension phenomena, Euler equations, Navier–Stokes equations, momentum equation, boundary layer flows, flows through pipework systems, buoyancy and flow resistance to 3D bodies, supersonic flows, flow measurement technology and visualisation, examples

→ 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 makes aeroplanes fly? What is a sonic boom? You understand these and other fundamental phenomena of fluid mechanics. You then use various experiments in the lab to test your new knowledge in practice.

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. 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.)

IT Project Management

1	1.1 Title of module (GER / ENG) **IT Projektmanagement / IT Project Management**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0190**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering	**C**	**3**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	Exercise	**1**	**15**		
	Total	Total contact hours in SWS	Total contact hours in hours **45**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation, follow-up work, preparation for the 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 plan and implement IT projects, and to document them to suit the target group, enabling them to contribute to IT projects in their future career.

5.2 Course content

- **Basic elements of planning activities**
- **Software for project planning processes**
- **Special features of IT projects**
- **Resource estimates**
- **Processes and process improvements**
- **Case examples**

→ 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.

IT projects are often very complex, with several programmers working on them simultaneously. Besides learning the basics of programming, you gain the knowledge required to plan and structure your project effectively.

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
Recommended reading:
H. Wieczorrek, P. Mertens: Management von IT-Projekten. Von der Planung zur Realisierung

IT Project Management – Realisation

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **IT Projektmanagement-Realisierung / IT Project Management – Realisation**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0061**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering	**C**	**3**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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	**4**	**60**	**300**	**10**
	Exercise	**1**	**15**		
	Practical course	**3**	**45**		
	Total	Total contact hours in SWS	Total contact hours in hours **120**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation, follow-up work, preparation for the 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 of the module, students will be able to formulate complex algorithms and implement them using a standard object-oriented programming language. In addition, students will be able to plan and implement IT projects, and to document them to suit the target group, enabling them to contribute to IT projects in their future career.

5.2 Course content

- **Basic elements of object-oriented thought**
- **Object-oriented formulation of algorithms**
- **Syntax and semantics of object-oriented programming languages**
- **Development environments**
- **Integration of external libraries**
- **Error detection and prevention**
- **Software development in a team**
- **Basic elements of planning activities**
- **Software for project planning processes**
- **Special features of IT projects**
- **Resource estimates**
- **Processes and process improvements**
- **Case examples**

→ 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.

When working on large IT projects, you will often collaborate with other developers. We show you how to plan and structure an overall project in a team, besides carrying out your own 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)

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
Recommended reading:
H. Wieczorrek, P. Mertens: Management von IT-Projekten. Von der Planung zur Realisierung

Joining Technology

1	**1.1 Title of module (GER / ENG)** **Fügetechnik /** **Joining Technology**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0042 / MB.2.0017**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	CE	5
	Mechanical Engineering (dual study)	**C**	**7**

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)	Seminaristic Lecture	**3**	**45**	**150**	**5**
	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, follow-up work, preparation for the 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 characterise the joining techniques commonly used in mechanical engineering, and will, in particular, be able to classify and compare different welding techniques. The wide range of joining techniques learned will enable students to select appropriate joining techniques for materials or components to be joined, taking into account structural and economic requirements. They will also be able to determine the corresponding filler materials, auxiliary materials and production parameters in a practice-oriented way. In their future careers, students will be able to use this knowledge to examine the relevance and feasibility of joining techniques for components to be produced, and to select them accordingly.
The practical course enables students to prepare series of experiments independently and as part of a team, and to subsequently examine and check them critically. They will be able to transfer the results to the theoretical knowledge gained, questioning them accordingly, and to formulate and present the results to suit the target group.

5.2 Course content

- **Mechanical joining techniques, as well as soldering and bonding techniques**
- **Welding techniques and machines**
- **Bonding techniques**
- **Metallurgical processes in welding and welding behaviour of metallic materials**
- **Heat treatment for welded constructions**
- **Aspects related to the design of connections**

→ 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 can components be joined? Should the joint be permanent? You get an overview of the different joining methods, and improve your skills of welding, bonding and mechanical joining techniques..

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:

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.)

Logistics

1	1.1 Title of module (GER / ENG) **Logistik / Logistics**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0079**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**5**
	Mechanical Engineering (dual study)		

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**		
	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, follow-up work, preparation for the 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 recognise and develop the technical and economic aspects of logical relationships. They will be able to express knowledge from the logistics aspects of procurement, production, distribution and disposal, and to derive their technological design with the aid of appropriate transportation and storage systems. The detailed knowledge gained is relevant in the professional context of an industrial engineer with regard to the planning, evaluation, design and assessment of logistics systems.

5.2 Course content

Types of logistics (procurement, production, distribution logistics) and methods of logistics (route planning, supplier evaluation), analysis of movements and the mathematical determination of cycle times and throughput, selection of means of conveyance, storage equipment, handling equipment, sorting and order picking technologies, handling and storage technology, planning techniques, material flow simulation.
Another focus is the design of conveyor equipment; so material flows can not only be designed but also technically dimensioned.

→ 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.

Logistics covers many fields – from procurement to production to disposal. You identify potential for optimisation in the individual areas, helping to cut costs or speed up production times, for example.

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

7.4 Maximum number of participants (optional)

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

Machine Elements

1	1.1 Title of module (GER / ENG) **Maschinenelemente / Machine Elements**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0080**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**2**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**2**
	Computer Science in Mechanical Engineering	**C**	**2**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**2**
	Mechanical Engineering (dual study)	**C**	**4**

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**	**150**	**5**
	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, follow-up work, preparation for the 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 design the ma-chine elements covered, select and use suitable machine elements in a function- and cost-oriented manner, dimension them reliably and represent them clearly in tech-nical drawings. In addition, the design-relevant stresses as well as stress capabilities and design characteristics of the machine elements are known. The students are familiar with the technical standards and basic design rules required for the design and can apply them professionally. In addition, they are able to transfer basic knowledge of higher mathematics, engineering mechanics and materials science to the machine elements dealt with. Through the skills developed, students have devel-oped a basic

understanding of the applicable techniques and methods as well as their limitations in the design and layout of machine elements and are able to apply them to engineering problems.

5.2 Course content

Exploration of:

- **Introduction to machine elements**
- **Strength calculation**
- **Axles, shafts and journals**
- **Bolt, pin connections and locking elements**
- **Bolted joints**
- **welded joints**
- **Bonded joints**

→ 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 aim of the lectures and exercises in this module is to make a significant contribution to engineering education by imparting technical and methodological knowledge as well as skills and abilities for developing and designing technical products.

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.)

Machine Elements / Design Engineering

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Maschinenelemente / Konstruktion** **Machine Elements / Design Engineering**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0081**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering	**C**	**2+3**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**2+3**
	Mechanical Engineering (dual study)		

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**	**240**	**8**
	Exercise	**1**	**15**		
	Practical course	**3**	**45**		
	Total	Total contact hours in SWS	Total contact hours in hours **105**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation, follow-up work, preparation for the examination		**135**		
	Total		Total non-contact hours **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 design and construct simple assemblies for general mechanical engineering. They will also be able to read assembly drawings, including those created by other members of the group. The design of assemblies in line with requirements enables the proper functioning of the assembly to be designed. It prevents damage due to undersizing and avoids a waste of resources due to oversizing.

5.2 Course content

Exploration of:
- **Bolted and pinned connections**
- **Welding**
- **Shaft-hub connections**
- **Strength determination**
- **Roller bearings**
- **Design and dimensioning of simple assemblies**
- **CAD technologies for creating assemblies in 2D and 3D**
- **Emphasis is placed on working as part of a team and the use of the 3D CAD software Siemens NX**

→ 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.

Durability and strength are important properties of an engineering design. You learn about the smallest functional machine parts and their tasks, and how to design them mathematically. You also practise reading technical drawings.

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) at the end of the 3rd semester

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. C. Spura

7.3 Professors (optional):

7.4 Maximum number of participants (optional)

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

Materials Engineering

1	1.1 Title of module (GER / ENG) **Werkstoffe / Materials Engineering**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0142**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering	**C**	**1**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**1**
	Mechanical Engineering (dual study)		

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**	**150**	**5**
	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, follow-up work, written elaboration		**75**		
	Total		Total non-contact hours **75**		

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 present the basic structure of engineered materials, and describe the production and application of material properties. In addition, they will be able to classify and compare important steel groups, cast iron materials and relevant heat treatment processes. Students will be able to link knowledge related to materials to the content of the other subject modules, and will be capable of identifying, systematically tackling, and assessing professional problems and tasks.
The aim of the practical course is to enable students to expand on the above aspects. In addition, students will be able to prepare series of experiments independently and as part of

a team, and to subsequently examine and check them critically. They will be able to transfer the results to the theoretical knowledge gained, questioning them accordingly, and to formulate and present the results to suit the target group.

5.2 Course content

Students are first introduced to crystalline material composition as a basis for understanding the mechanical properties. Building on this, students discuss material properties as a key factor for material selection, the methods used to produce them in materials testing, and their application to simple examples. Using this knowledge, students address important groups of materials, particularly steel groups, cast iron materials and several non-ferrous materials. The module is rounded off with knowledge as to how material properties defined by adapted heat treatments can be set (annealing process, hardening and tempering, surface layer treatment).

→ 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.

Diverse machinery calls for a vast range of materials. You discover where and how materials are used, and how to test them in terms of their properties.

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:

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.)

Materials Engineering 1

1	**1.1 Title of module (GER / ENG)** **Werkstofftechnik 1 /** **Materials Engineering 1**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0143**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**1**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**1**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**1**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**1**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**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**	**150**	**5**
	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, follow-up work, written elaboration		**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 derive the properties of engineered materials from their structure and the material processes used to produce and process them. They will be able to describe important material properties and the methods used to determine them, and to transfer them to simple application cases. In the exercise classes, the specialist knowledge gained is expanded on and broadened using examples. In addition, students will hone their soft skills by tackling tasks in groups and then presenting the solutions to suit the target group.
The practical courses enable students to independently characterise materials, and to explain and implement the treatment and testing of materials. They will be able to select

appropriate materials in specific cases. This is an important precondition for being able to adequately accompany construction design processes in their future career. By carrying out, evaluating and analysing experiments in small groups, students hone their communication skills and capacity for teamwork.

5.2 Course content

Students are first introduced to crystalline material composition as a basis for understanding the mechanical properties. Building on this, students discuss material properties as a key factor for material selection, the methods used to determine them in materials testing, and their application to simple examples. Students also address the behaviour of materials under elevated temperatures. Based on this, students will learn the structure of alloy systems and can derive the structural composition accordingly.

→ 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 materials are suitable for manufacturing industrial products? To be able to answer such questions, you explore structures and properties of technical materials, as well as methods of materials testing and selection.

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:

Dr.-Ing. Miriam Laubrock

7.3 Professors (optional):

Dr.-Ing. Miriam Laubrock

7.4 Maximum number of participants (optional)

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

Materials Engineering 2

1	**1.1 Title of module (GER / ENG)** **Werkstofftechnik 2 /** **Materials Engineering 2**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0144**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**2**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**2**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**4**

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**	**150**	**5**
	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, follow-up work, written elaboration		**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 classify and compare structural materials commonly used in engineering. They will be able to systematically and methodologically tackle certain problems related to materials engineering, and to select materials in an application-related manner, based on the operational loads required and the processing and functional characteristics. Students will also be capable of selecting appropriate heat treatment processes.
The practical courses enable students to independently characterise materials, and to explain and implement the treatment and testing of materials. They will be able to select appropriate materials in specific cases. This is an important precondition for being able to

adequately accompany construction design processes in their future career. By carrying out, evaluating and analysing experiments in small groups, students hone their communication skills and capacity for teamwork.

5.2 Course content

- **Special heat treatment processes**
- **Material behaviour under dynamic loads**
- **Corrosive and tribological material stress**
- **Steel selection on the basis of hardenability**
- **Construction steels**
- **Corrosion-resistant steels**
- **Tool steels**
- **Cast iron materials**
- **Light metals**
- **Engineering plastics**
- **Sliding and bearing materials**

→ 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 on your knowledge from Materials Engineering I, you now deal with more specific steel and plastic materials. You also learn about finishing processes, and are able to select suitable materials for technical 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
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:

Dr.-Ing. Miriam Laubrock

7.3 Professors (optional):

Dr.-Ing. Miriam Laubrock

7.4 Maximum number of participants (optional)

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

Mathematics 1

1	1.1 Title of module (GER / ENG) **Mathematik 1 / Mathematics 1**			1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0082**
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:
	Bachelor`s programmes:				
	Mechanical Engineering - International Engineering (Outgoings)			**C**	**1**
	Mechanical Engineering - International Engineering (Incomings)				
	Mechanical Engineering - Specialisation in Plant Engineering			**C**	**1**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering			**C**	**1**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology			**C**	**1**
	Computer Science in Mechanical Engineering			**C**	**1**
	Business Administration & Engineering majoring in Mechanical Engineering			**C**	**1**
	Mechanical Engineering (dual study)			**C**	**1**

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	**4**	**60**	**240**	**8**
	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, follow-up work, preparation for the 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?)

After successful completion of the module, students will be able to define the concept of convergence, and determine the limits of sequences, series and functions. They will also be able to compute Taylor polynomials of functions, and to use them in the context of application. Students will apply the solution theory to linear systems of equations, and will be able to recognise the relationships between the rank, invertibility, regularity and singularity of square matrices, and to assess them in the relevant context. Students will be able to implement typical approaches and thought patterns in the abstraction, analysis and solution finding of problems.

5.2 Course content

Calculus:

Discrete mathematics, sequences, series, convergence, the concept of limits, algebraic and transcendental functions, the concept of continuity, real scalar differential calculus including applications, power series, Taylor expansion and approximation, real scalar integral calculus

Linear algebra:

Algebraic structures, residue classes, complex numbers, polynomials, factorisation, partial fraction decomposition, linear systems of equations and matrices, Gaussian algorithm, matrix product, vector spaces, matrix inversion, regular and singular matrices

→ 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.

Maths is a key element of your degree and profession. In this module, you start by laying the foundation and gaining the basic knowledge required to understand the laws of technical phenomena and to describe them mathematically.

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, Professor Dr.-Ing. J. Korn,
Lecturer Dipl.-Math. M. Kumfert, D. Paluch M.Sc.

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

Mathematics II

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Mathematik II / Mathematics II**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0084**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology (General Mechanical Engineering)	**C**	**2**
	Computer Science in Mechanical Engineering	**C**	**2**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**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	**4**	**60**	**210**	**7**
	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, follow-up work, preparation for the examination		**120**		
	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?)

After successful completion of the module, students will be able to apply the basics of integral calculus. Using differential and integral calculus, they will be able to transfer relationships of the type A=BC to situations in which B is a function of C. They will be able to implement the foundations of multidimensional analysis, and will be able to use the gradient and the Hessian matrix to determine extreme values of scalar fields. Students will also be able to carry out the linear-quadratic approximation of adequately smooth functions of several variables. In addition, students will be able to solve initial value problems of linear differential equations. They will also be conversant with the basics of spectral theory, and will be able to determine eigenvalues and eigenspaces of square matrices. Students will be able to implement typical approaches and thought patterns in the abstraction, analysis and solution finding of problems.

5.2 Course content

Calculus:

Multidimensional real differential calculus, space curves, scalar fields, vector fields, tangential vectors, gradient, Jacobian matrix, total differential, Hessian matrix, Laplace operator, diffusion equations, partial differential equations, multidimensional Taylor approximation, unrestricted nonlinear optimisation problems, multiple integrals, line integrals, cyclic integrals, ordinary differential equations, initial value problems, elementary solution methods, linear differential equation systems, variation of parameters, scalar differential equations of the nth order, Laplace transform

Linear algebra:

Determinants, kernel and image of a matrix, dimension and the concept of a basis, linear maps, geometry of linear maps, symmetric matrices, the concept of definiteness, rotation matrices, cross product, scalar triple product, eigenvalues and eigenvectors, spectral theorem and principal axis theorem

→ 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, you enhance your basic knowledge of mathematics. This enables you to solve technical issues independently, down to the smallest detail.

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, Lecturer

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., et al. Mathematik für Ingenieure, Band 1 + 2, Springer Verlag
GÖLLMANN, L., Henig Ch., Arbeitsbuch zur Linearen Algebra, 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

Mathematics 2 / Statistics

1	**1.1 Title of module (GER / ENG)** **Mathematik 2 / Statistik** **Mathematics 2 / Statistics**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0086**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**2**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**2**
	Computer Science in Mechanical Engineering	**C**	**2**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**2**
	Mechanical Engineering (dual study)	**C**	**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	**4+2**	**60+30**	**210**	**7**
	Exercise	**2+1**	**30+15**		
	Total	Total contact hours in SWS	Total contact hours in hours **135**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 basics of integral calculus. Using differential and integral calculus, they will be able to transfer relationships of the type A=BC to situations in which B is a function of C. They will be able to implement the foundations of multidimensional analysis, and will be able to use the gradient and the Hessian matrix to determine extreme values of scalar fields. Students will also be able to carry out the linear-quadratic approximation of adequately smooth functions of several variables. In addition, students will be able to solve initial value problems of linear differential equations. They will also be conversant with the basics of spectral theory, and will be able to determine eigenvalues and

eigenspaces of square matrices. Students will be able to implement typical approaches and thought patterns in the abstraction, analysis and solution finding of problems. Moreover, students will be able to create their own context-based statistical analyses, as well as interpret and critically question statistical analyses carried out by third parties. Students will apply fundamental mathematical-statistical methods, and transfer them to other tasks. This will particularly enable them to expand on their mathematical/analytical skills. In addition, students will also improve their communication skills by tackling tasks in small groups. Finally, the module gives students the opportunity to enhance their general willingness to learn by expanding their basic knowledge.
The specialist knowledge taught in the Mathematics II / Statistics module is a solid basis for getting to grips with new fields of activity not only in the further course of the programme, but also after graduation. Last but not least, students will be able to develop the basis for subsequent postgraduate education.

5.2 Course content

Calculus:

Multidimensional real differential calculus, space curves, scalar fields, vector fields, tangential vectors, gradient, Jacobian matrix, total differential, Hessian matrix, Laplace operator, diffusion equations, partial differential equations, multidimensional Taylor approximation, unrestricted nonlinear optimisation problems, multiple integrals, line integrals, cyclic integrals, ordinary differential equations, initial value problems, elementary solution methods, linear differential equation systems, variation of parameters, scalar differential equations of the nth order, Laplace transform

Linear algebra:

Determinants, kernel and image of a matrix, dimension and the concept of a basis, linear maps, geometry of linear maps, symmetric matrices, the concept of definiteness, rotation matrices, cross product, scalar triple product, eigenvalues and eigenvectors, spectral theorem and principal axis theorem

Statistics:

Distinction between descriptive, inductive and explorative statistics, sequence of a statistical analysis, preparation of empirical data, basic concepts of combinatorial analysis, chance and probability, foundations of probability distributions, special probability distributions, parameter estimations, parameter and distribution tests, measurement errors and error propagation, correlation and regression
Different weighting is given to the aforementioned statistics topics at the advanced stage.
Module content is systematically developed and taught in a structured manner with the involvement of students.

→ 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 basic knowledge from the first semester, you enhance your mathematical expertise. You deal with technical tasks in even greater detail, and solve them independently.

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. rer. nat. L. Göllmann, Prof. Dr. rer. nat. M. Geisler

7.3 Professors (optional):

	Prof. Dr. rer. nat. L. Göllmann, Prof. Dr. rer. nat. M. Geisler
	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. et al., Mathematik für Ingenieure, Band 1 + 2, Springer Verlag** **GÖLLMANN, L., Henig Ch., Arbeitsbuch zur Linearen Algebra, 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** **RINNE, H., Taschenbuch der Statistik. Harri Deutsch**

Measurement Technology

1	1.1 Title of module (GER / ENG) **Messtechnik / Measurement Technology**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0088**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering	**CE**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	Exercise	**1**	**15**		
	Practical period	**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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 are able to describe measurement signals mathematically, evaluate them using error measures and improve them. Furthermore, they are familiar with the concept of state observation and can thus, using suitable models, also provide non-measurable information.

Through the exercise and the practical course the theoretical basics from the lecture are deepened and in particular the safe handling of Jupyter notebooks (Python) is acquired.

5.2 Course content

- **Stochastic signals**
- **Measurement systems and measurement errors**
- **State space description**
- **System theoretical description of measurement systems**
- **State observers**
- **Sensor fusion: Complementary and Kálmán filters**

→ 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.

Information about the underlying system is required in particular for control engineering applications. You are able to process measurement signals for this purpose and to provide internal (non-measurable) system state information.

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: ….)*

Mathematics 2
Recommended: Closed Loop Control (should be attended in parallel or already completed), Programming Basics

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. 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.)

Mechanics of Materials and Dynamics

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Elastostatik und Dynamik /** **Mechanics of Materials and Dynamics**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0026**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology (General Mechanical Engineering)	**C**	**2**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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	**4**	**60**	**300**	**10**
	Exercise	**4**	**60**		
	Total	Total contact hours in SWS	Total contact hours in hours **120**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation, follow-up work				
	preparation for the examination				
	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?)

Mechanics of materials:
After successful completion of the module, students will be able to demonstrate the basic methodological approach for solving problems related to mechanics of materials. They will be able to determine tensile and compressive stresses, bending stresses, torsional stresses and transverse shear stresses in building components. Concerning the "buckling" stability problem, students will know how to analyse the actual system, refer to a case of buckling, and calculate buckling stresses. Students will be able to determine component deformations and formulate deformation approaches in order to investigate statically indeterminate systems. Students will be able to derive abstract mechanical models from practice-related problems of mechanical engineering, and to interpret and critically assess their own results. They will also be able to name the limitations of the calculation models presented.
The specialist solution strategies gained are the basis for understanding advanced study elements, and can be transferred to related engineering subjects such as machine elements, construction design and finite elements. In addition, they are an essential precondition for enabling students to design machinery and its components correctly in terms of load in their later professional environment.
Dynamics:
After successful completion of the module, students will be able to demonstrate the basic methodological approach for solving dynamic problems. They will be able to determine position, velocity and acceleration vectors for mass points and for random points on rigid bodies in plane motion. They will be able to investigate the interaction between the motion of a body and the action of force on that body using the fundamental law of dynamics, the energy theorem and law of conservation of energy, or the principle of linear and angular momentum. Students will be able to derive abstract mechanical models from practice-related problems of mechanical engineering, and to interpret and critically assess their own results.
The specialist solution strategies gained are the basis for understanding advanced study elements, and can be transferred to related engineering subjects such as machine elements, construction design and gear technology. In addition, the solution strategies are an essential precondition for enabling students to determine motion sequences in machinery in their later professional environment, and to create products that meet kinematic and kinetic requirements.

5.2 Course content

Mechanics of materials:
- **Tensile and compressive stresses, surface pressure**
- **Bar deformations, statically indeterminate bar systems**
- **Moments of inertia of area**
- **Straight and general bending**
- **Torsion of circular and circular-ring cross-sections; torsion of open and closed thin-walled cross-sections**
- **Transverse shear stress of the full cross-section and of thin-walled cross-sections**
- **Shear centre**
- **Uniaxial and multiaxial stress and deformation states, influence of temperature**
- **Composite stresses**
- **Euler buckling cases, buckling theory according to Tetmajer**

Dynamics:
- **Kinematics of the mass point**
- **Kinetics of the mass point**
- **Kinematics of a rigid body in plane motion**
- **Relative kinematics**
- **Kinetics of a rigid body in plane motion**
- **Kinetics of the point mass system**
- **Impact laws**
- **Oscillations with one degree of freedom**

→ 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 knowledge of statics, you now progress to deformation and stress states, as well as dynamic processes. The knowledge gained enables you to create an important knowledge base for subsequent modules.

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. 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;
Dankert, H. / Dankert, J.: Technische Mechanik, Teubner Verlag

Modeling and Simulation

1	**1.1 Title of module (GER / ENG)** **Modellbildung und Simulation /** **Modeling and Simulation**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0191**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering	**C**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 mathematical modelling approaches for dynamic systems which are most relevant to practice. Besides that they learn to apply numerical algorithms to find solutions. In combination with simulation approaches and tools the students will be capable to build up such models (especially in the domain of mechanical engineering), to analyse and present them. They can apply numerical optimization methods to practical problems.

5.2 Course content

- **Basics of modelling and simulation**
- **Graphical modelling with SIMULINK**
- **From model towards differential equation system (Lagrange`s equations)**
- **Oscillations (Fourier series and discrete Fourier transform)**
- **Queueing theory, cellular automatons**
- **Modelling with neural networks**
- **Local and global optimization problems as well as tools for their solution**

→ 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.

Industrial tasks are becoming increasingly complex, and can only be solved with the use of computers. It is therefore all the more important for you to be proficient in mathematical systems and simulation methods.

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.)

Numerical Software

1	1.1 Title of module (GER / ENG) **Numerik Software / Numerical Software**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0091**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering	**C**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	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, follow-up work, preparation for the 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 assess numerical solution methods and implement them in an application-related manner using standard numerical software. This will enable them to solve relevant interdisciplinary issues in their professional work.

5.2 Course content

- **Introduction to the theory of numerical analysis (error calculation, condition, calculation of roots)**
- **Introduction to the main features of a numerical software program (MATLAB / Octave)**
- **Creation of 2D and 3D graphics and animations**
- **Development and use of scripts and modules**
- **Introduction to theory of numerics**
- **Solution methods for differential equations**
- **Numerical differentiation, integration, regression**

→ 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 technical problems can be solved using mathematical models. Calculators are often limited in their ability to handle such problems. In such cases, you use numerical methods.

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

Object-oriented programming

1	**1.1 Title of module (GER / ENG)** **Objektorientierte Programmierung / Object-oriented programming**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0199**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**3 o. 5**
	Computer Science in Mechanical Engineering	**C**	**3**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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)	Seminaristic Lecture	**2**	**30**	**150**	**5**
	Practical course	**3**	**45**		
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 complex algorithms and implement them using a standard object-oriented programming language (C++). Relevant methods of software development are trained.

5.2 Course content

• Basic elements of object-oriented thought
• Object-oriented formulation of algorithms
• Syntax and semantics of object-oriented programming languages
• Development environments
• Integration of external libraries
• Error detection and prevention
• Software development in a team

→ 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 Foundations of Programming module, you now use a more sophisticated programming language to handle even complex 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 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

Physics

1	1.1 Title of module (GER / ENG) **Physik / Physics**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0094**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**1**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**1**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**1**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**1**
	Computer Science in Mechanical Engineering	**C**	**1**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**1**
	Mechanical Engineering (dual study)	**C**	**1**

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, follow-up work, preparation for the 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 demonstrate basic knowledge of physical quantities and relations. This is necessary as a basis for proceeding with the engineering programme. Simple physical problems from the fields of mechanics, oscillations and waves can be analysed methodologically, in order to develop solution methods from them and to implement them quantitatively.
After actively participating in the exercise class, students will be able to transfer the specialist knowledge gained in the lectures to practical examples, enabling them to gain a profound understanding of the content. In addition, students will be able to formulate and present the

results generated to suit the target group. Group work will strengthen students' capacity for teamwork and communication skills.

5.2 Course content

The following concepts are addressed: physical quantities and units, measuring physical quantities, kinematics and dynamics of mass points and rigid bodies, work, power, energy, momentum, kinematics and dynamics of oscillating bodies, the basic concepts of waves, and foundations of hydrostatics and hydrodynamics. Particular emphasis is placed on applying the laws of conservation to solve physical problems. The lectures and exercise classes include experiments involving students to illustrate the subject matter.

→ 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 address simple physics problems, giving you a basic understanding of physical relationships – especially in the areas of mechanics and vibrations. This gives you an important knowledge base for your further 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:

Prof. Dr.-Ing. J. Hartleb (BaMB), Prof. Dr.-Ing. A. Komainda (BaMBI, BaMB-D, BaMB-W)

7.3 Professors (optional):

Prof. Dr.-Ing. A. Komainda (BaMB: Representation in WiSe 23/24, BaMBI, BaMB-D, BaMB-W)

7.4 Maximum number of participants (optional)

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

Recommended reading:

Halliday, Resnick, Walker;
Physik, Bachelor Edition; Wiley-VCH, 2007; ISBN: 978-3-527-40746-0

Giancoli, Douglas C.;
Physik; Person Studium, 3rd edition 2006, ISBN-13: 978-3-8273-7157-7, ISBN-10: 3-8273-7157-0

Rybach, Johannes;
Physik für Bachelors; Fachbuchverlag Leipzig (Hanser), ISBN 978-3-446-40787-9

Kuchling, Horst;
Taschenbuch der Physik; Fachbuchverlag Leipzig (Hanser), ISBN 3-446-18692-1

Kurz, Günther; Hübner, Heide;
Prüfungs- und Testaufgaben zur Physik; Mechanik - Schwingungslehre – Wärmelehre; Fachbuchverlag Leipzig (Hanser), 2008, ISBN 978-3-446-40710-7

Lindner;
Physikalische Aufgaben; Fachbuchverlag Leipzig (Hanser), ISBN-10: 3446224262, ISBN-13: 978-3446224261

Process Engineering Project

1	**1.1 Title of module (GER / ENG)** **Anlagentechnisches Projekt /** **Process Engineering Project**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0012**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE (PL)**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**3 o. 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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)				**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, follow-up work				
	written elaboration, presentation				
	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 of the module, students will be able to independently tackle a practice-based plant engineering assignment within the time allowed, using cross-module approaches. Students will be able to apply the basics and skills already learned on the course, and to transfer them to the problems at hand. Building on this, students will be able to develop the approach and implement it independently. In addition to executing the project, students will be able to formulate the approaches used and the results obtained in the form of a report, besides plausibly presenting the approaches and results, and explaining them in the context of a discussion.

The module content prepares students for the Bachelor thesis, which also involves independently 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 present technical issues with confidence.

5.2 Course content

Group work (with a maximum of 4 students) or individual work over a maximum period of 2 months
Cross-module assignments from the subject areas of the degree programme.
Final presentation and discussion in the presence of the supervisor(s). The project assignment may originate from industry or from the university.

→ 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.

Either alone or as part of a team, you independently tackle a realistic assignment from the field of process engineering within a set time. You use various approaches that you learned on your programme, preparing you for your Bachelor's 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: ….)*

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 15-20 pages); presentation followed by a discussion, 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. J. Scholz

7.3 Professors (optional):

Lecturers on the Bachelor's programme in Mechanical Engineering, specialisation in Plant Engineering

7.4 Maximum number of participants (optional)

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

Process Technology 1

1	**1.1 Title of module (GER / ENG)** **Verfahrenstechnik 1 /** **Process Technology 1**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0134**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C / CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4**
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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)	Seminaristic Lecture	**3**	**45**	**150**	**5**
	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, follow-up work, written elaboration		**75**		
	Total		Total non-contact hours **75**		

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 process engineering plants and material systems on the basis of their main components and properties. They will be able to describe various unit operations of process engineering, particularly in the field of mechanical process technology, and place them in the process engineering context. As a result, students will be able to design systems and select, design and assess appropriate methods for solving a process engineering task. In addition, students will be able to independently generate, analyse, assess and present experimental data in the context of experiments.

The module content enables students to assess the sub-processes of process engineering within machinery and apparatus, also in other technical fields, and hence to optimise their design and construction.
The practical courses enable students to understand the implementation and assessment of process engineering processes. To achieve this, selected process engineering 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

• Introduction to process engineering
• Characterisation of material properties (particles, fluids and multiphase systems)
• Selected unit operations and systems of process engineering (e.g. stirring, separation, filtration, grinding, bulk solids handling)

→ 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.

Process technology is used to change material properties or composition. You learn fundamentals of particle charcterization and of machine operation in mechanical process technology for different industrial 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
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:
K. Schwister: “Taschenbuch der Verfahrenstechnik”, 2nd edition, Hanser-Verlag, 2005
W. Hemming, W. Wagner: “Verfahrenstechnik”, 9th edition, Vogel-Verlag, 2004
K. Schwister, V. Leven: “Verfahrenstechnik für Ingenieure”, 1st edition, Hanser-Verlag, 2013
Lecture notes and documentation relating to the practical course

Process Technology 2

1	1.1 Title of module (GER / ENG)	1.2 Short description (optional)	1.3 Module code (from HIO)
	Verfahrenstechnik 2 / Process Technology 2		**MB.1.0136**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C / CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**5**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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)	Seminaristic Lecture	**3**	**45**	**150**	**5**
	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, follow-up work, written elaboration		**75**		
	Total		Total non-contact hours **75**		

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 have considerable expertise with regard to various unit operations of process engineering, especially in the field of thermal process engineering. They will be able to design systems, including the appropriate measurement and control instrumentation, as well as select, design and assess appropriate methods for solving the process engineering task. In addition, students will be able to independently generate, analyse, assess and present experimental data. On the basis of their expertise in the unit operations of process engineering, students will be able to develop and assess complex process engineering processes.
The aim of the practical courses is to enable students to gain skills in implementing and assessing process engineering processes. To achieve this, selected process engineering processes are conducted independently as experiments, including the relevant methods of analysis, 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

- Selected unit operations and systems of process engineering, and especially thermal process technology (e.g. distillation, extraction, drying)
- Introduction to chemical and biological processes
- Operational behaviour of process engineering systems (residence time etc.)
- Applications of complex process engineering processes and systems
- Instrumentation and control in process engineering systems

Outlook on aspects concerning instrumentation with regard to process engineering systems
The course builds on the Process Engineering I module.

→ 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.

Processing plants consist of diffenernt apparatus and machines. You learn findamentals of thermal process technlogy and analyze complex process tecnology plants with the associated components.

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. 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:

K. Schwister: “Taschenbuch der Verfahrenstechnik”, 2nd edition, Hanser-Verlag, 2005
W. Hemming, W. Wagner: “Verfahrenstechnik”, 9th edition, Vogel-Verlag, 2004
K. Schwister, V. Leven: “Verfahrenstechnik für Ingenieure”, 1st edition, Hanser-Verlag, 2013
Lecture notes and documentation relating to the practical course

Production Engineering 1

1	**1.1 Title of module (GER / ENG)** **Fertigungsverfahren 1 /** **Production Engineering 1**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0036**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**4**
	Mechanical Engineering - International Engineering (Incomings)	**C**	**1.GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**4**
	Computer Science in Mechanical Engineering	**C**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**4**
	Mechanical Engineering (dual study)	**C**	**6**

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**	**150**	**5**
	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, follow-up work, preparation for the 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 appropriate production processes (forming, transforming and separating with a geometrically defined cutting edge), demonstrate their application, and apply the necessary metrology. Students will also be able to plan the production runs of these production processes. In addition, they will be capable of comparing individual tools. Students will also be able to select tools that are appropriate and suitable for the production situation, and to assess their use in terms of

optimised production. 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 set tasks, building on the specialist knowledge gained in the lectures, and to formulate and present the results to suit the target group. This enables students to expand on their practical experience and to handle the necessary metrology. They will evaluate production processes, including monitoring cutting forces and working out the Kienzle equation.

5.2 Course content

First of all, an explanation is given of the necessary metrology, including surface metrology and 3D coordinate metrology. Then the basic concepts of metal-cutting technology (chip formation, angle, cutting forces, wear and tear, service life), cutting materials (HSS, carbides, ceramics, CBN, PCD) and machinability (including dry machining) will be addressed. An explanation is also given of the production processes of forming and transforming, together with the associated machine tools. Finally, light is shed on the aspect of cost-efficient production, including unit costs and economic cutting conditions.
In the exercise classes, students will calculate forces, torques, power, etc.
In the laboratory class experiments, small groups of students will use measuring machines and machine tools to assess and evaluate the thematic areas addressed.
→ 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.

New manufacturing processes in the field of shaping, forming and prototyping will be explained and discussed and applications in the field of industry will be explored. Over this, separating processes like milling and turning will be present within special practice.

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 – and successful recognition of – the practical course are requirements for admission to the module examination. For successful recognition, students must answer comprehension questions about the upcoming experiment at the start of the practical course.

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.)

- Fritz Klocke, Wilfried König:
Fertigungsverfahren 1, (7th revised edition); Springer-Verlag
- Tönshoff, H.-K.; Denkena, B.:
Spanen, Grundlagen (3rd revised and expanded edition); Springer-Verlag
- Manfred Weck, Chr. Brecher:
Werkzeugmaschinen, Maschinenarten und Anwendungsbereiche (6th completely revised edition); Springer-Verlag

Production Engineering 2

1	**1.1 Title of module (GER / ENG)** **Fertigungsverfahren 2 /** **Production Engineering 2**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0039**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C / CE**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**5**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**5**
	Mechanical Engineering (dual study)	**C**	**7**

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**	**150**	**5**
	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, follow-up work, preparation for the 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 appropriate production processes (separating with a geometrically undefined cutting edge, jointing, coating, changing substance properties), demonstrate their application, and determine the necessary metrology. In addition, students will be able to plan the production runs for entire production processes. They will also be able to compare individual production processes, and to select appropriate and suitable processes and assess their use in terms of optimised production. 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 set tasks, building on the specialist knowledge gained in the lectures, and to formulate and present the results to suit the target group. This enables students to expand on their practical experience and to handle the necessary metrology. They will evaluate production processes, including monitoring cutting forces, torques and power.

5.2 Course content

First of all, an explanation is given of the machining processes with an undefined cutting edge, including the contact conditions in each case. In the case of eroding processes (spark erosion, electron and laser beam, ECM), the physical principles are also explained. In addition, an explanation is given of the following production processes: jointing, coating and changing material properties. In the final section, special production processes such as laser technology and plastics technology are described, and aspects related to production planning and assembly techniques are explained. The relevant machine tools in all of the production processes are also addressed.
In the exercise classes, students will calculate forces, torques, power, etc., and go over the main content again. In the laboratory class experiments, small groups of students will use machine tools to assess and evaluate the thematic areas addressed.

→ 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.

More manufacturing processes like gluing and welding, performance modification of materials and coating will complete the variety of different manufacturing processes to be learnt for planning new manufacturing processes for future demands of modern technologies.

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 – and successful recognition of – the practical course are requirements for admission to the module examination. For successful recognition, students must answer comprehension questions about the upcoming experiment at the start of the practical course.

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.)

- Fritz Klocke, Wilfried König:
Fertigungsverfahren 2 bis 4 (completely revised editions); Springer- Verlag
- Tönshoff, H.-K.; Denkena, B.:
Spanen, Grundlagen (3rd revised and expanded edition); Springer-Verlag
- Manfred Weck, Chr. Brecher:
Werkzeugmaschinen (6th completely revised edition); Springer-Verlag

Programmable Logic Control

1	**1.1 Title of module (GER / ENG)** **Steuerungstechnik /** **Programmable Logic Control**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0114**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering	**C**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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**	**150**	**5**
	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, follow-up work, preparation for the 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 recognise and describe the functioning of programmable logic controllers (PLCs). In particular, they will be able to analyse the combination and interplay between hardware and software in control systems, for example. In addition, students will be able to transfer the theoretical structure of programs to the practical programming of sequences and operating interfaces for PLCs. Students will be able to select appropriate PLCs, depending on the application.
The practical course enables students to expand on and consolidate the specialist knowledge gained in the lectures by transferring the knowledge to practical applications.

Students will be able to create circuits from control engineering, and to programme PLCs. By using market-dominating control systems by the company Siemens, students will particularly be prepared for the usual working environment of a control engineer.

5.2 Course content

Lecture:
- **Introduction, Boolean algebra**
- **Control components**
- **Implementation of sequence controls**
- **Programming PLCs**
- **Pneumatic components and systems**
- **Sensors**

Exercise class:
- **Calculation and programming examples**

Practical course:
- **PLC programming in small groups (each containing two students)**

→ 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 industry, programmable memories are used to regulate and control machines and systems in a user-specific way. In this module, you familiarise yourself with their structure and mode of operation.

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.)

Programming Basics

1	**1.1 Title of module (GER / ENG)** **Grundlagen der Programmierung / Programming Basics**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0052**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**2**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**2**
	Computer Science in Mechanical Engineering	**C**	**2**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**2**
	Mechanical Engineering (dual study)	**C**	**4**

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**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 algorithms and implement them using a standard programming language.
For students pursuing the degree programme in Mechanical Engineering - Specialisation in Construction and Manufactoring Technology , the specialist knowledge gained is an important prerequisite for the more complex programming paradigms addressed at a later stage of the course.

5.2 Course content

- **Basic elements of algorithms**
- **Formulation of the structure of algorithms**
- **Basic elements of a modern programming language**
- **Implementation of algorithms – programming language**
- **Development environments**
- **Error detection and prevention**
- **Documentation of programs**

→ 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.

There are lots of programming languages for a wide range of applications. By working on your own small projects, you familiarise yourself with a modern language commonly used in mechanical engineering.

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):

L. Wieneke M.Sc.

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

Programming Languages 2

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Programmiersprachen 2 / Programming Languages 2**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0101**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**5**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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**	**150**	**5**
	Practical course	**3**	**45**		
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 complex algorithms and implement them using a standard object-oriented programming language. This will enable them to contribute competently to IT projects in their future career.

5.2 Course content

- **Basic elements of object-oriented thought**
- **Object-oriented formulation of algorithms**
- **Syntax and semantics of object-oriented programming languages**
- **Development environments**
- **Integration of external libraries**
- **Software architectures**
- **Graphic user interfaces**
- **Error detection and prevention**
- **Software development in a team**

→ 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 Foundations of Programming module, you now use a more sophisticated programming language to handle even complex 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 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

Project (Dual Study)

1	**1.1 Title of module (GER / ENG)** **Projektarbeit (Duales Studium) /** **Project (Dual Study)**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0102**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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)				**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, follow-up work, preparation for the 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?)

After successful completion of the module, students can independently work on a science- or practice-oriented task within a specified period, both in its technical details and in the interdisciplinary contexts according to specialist practical and scientific methods. Eventually they present their results in a talk with a subsequent Discussion. The project work thus prepares for the independent implementation of the bachelor thesis.

5.2 Course content

Practice-oriented task from the subject area of the course; usually the work is carried out in cooperation with industry.

→ 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 delve deeply into a scientific assignment or a practical task. You summarise your results in a term paper and present them in 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: ….)*

See current version of the Examination 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)

Duration max. 3 months; written elaboration by the examination candidate (main body of text approx. 15-20 pages), presentation followed by a discussion (max. 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. Apmann, Professor Dr. rer. nat. L. Göllmann

7.3 Professors (optional):

7.4 Maximum number of participants (optional)

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

Project Management

1	1.1 Title of module (GER / ENG) **Projektmanagement / Project Management**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0103**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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	**2**	**30**	**150**	**5**
	Exercise	**1**	**15**		
	Practical course / simulation game	**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, follow-up work, preparation for the 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 analyse a problem and, building on their analysis, develop an upcoming project and define its objectives, and also structure and plan the project themselves. To achieve this, students will be able to apply the basic tools of project management. Students will also be able to analyse and assess the course of the project on the basis of the key performance indicators generated, and, building on this, develop and initiate measures for achieving the project objectives. In addition, students will be able to communicate the project results to suit the target group.
The skills acquired will be expanded on in a simulation game, strengthening students' social skills due to their involvement in a project team.
The module is of great practical relevance for professional life as an engineer, given that project execution is a core task.

5.2 Course content

- **Characteristics and stages of a project**
- **Definition of project objectives**
- **Project planning, control and management tools**
- **Sequencing and time planning, cost and risk management**
- **Project completion and documentation**
- **Consolidation of content in a simulation game**

→ 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.

Project management provides the basic knowledge for planning and executing projects in a corporate environment. Terms, methods, and tools of project management are introduced with practical examples and exercises.

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 / Lecturer Dr. M. Lutterbeck for Bachelor programme in Mechanical Engineering - Specialisation in Plant Engineering

7.4 Maximum number of participants (optional)

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

Recommended reading: Walter Jakoby: Projektmanagement für Ingenieure: Ein praxisnahes Lehrbuch für den systematischen Projekterfolg, 5. Auflage 2021
Lecture notes

Quality Management

1	1.1 Title of module (GER / ENG) **Qualitätsmanagement / Quality Management**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0103**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering	**CE**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4**
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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)	Seminaristic Lecture	**4**	**60**	**150**	**5**
	Exercise	**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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 outline the principles of quality management. They will differentiate key methods and tools for ensuring product quality, from the product idea to product disposal, and will be able to identify and highlight connections and problems related to quality. In the exercise classes, students will be able to transfer the knowledge acquired to practice-oriented issues and design problem-oriented solutions, enabling them to meet the professional challenges of quality management in engineering practice.

5.2 Course content

- **Introduction and overview**
  - **Terms, fundamental aspects and historical development**
- **Production metrology**
- **Overview of methods and tools for quality management**
  - **The seven elementary quality tools**
  - **Other methods and tools**
  - **Mathematical methods**
- **QM standards, QM audit, QM certification**
- **Quality costs**
- **Legal aspects**
  - **Legal liability**
  - **Equipment and product safety**
  - **Labour and environmental protection law**
- **Integrated Management System, TQM and Business Excellence**
  - **QM, UM, ASM, ...**
  - **Basic ideas of TQM**
  - **Quality awards**

→ 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.

Quality management is an established feature of any large company. It ensures that processes and products maintain a certain standard. You learn methods and principles, and are able to transfer them to practical examples.

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. G. Gevelmann

7.3 Professors (optional):

Lecturer Dipl.-Ing. M. Kaczor

7.4 Maximum number of participants (optional)

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

Spanish for Engineering and Latin American Culture 1

1	**1.1 Title of module (GER / ENG)** **Spanisch für Ingenieurwissenschaften und Kultur Lateinamerikas 1 /** **Spanish for Engineering and Latin American Culture 1**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **ITB.1.0175**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**3**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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)	Seminaristic Lecture / Exercise	**4**	**60**	**150**	**5**
	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, follow-up work, preparation for the 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 should be proficient in the subject matter learned so far and, by passing the written exam and giving the first presentation, should have taken the first major step towards meeting the B2 level of the European Framework of Reference for Languages by the end of the second course.
Students have a good command of the specific vocabulary concerning the engineering

context. They will be able to understand technical presentations, actively participate in technical discussions and also give technically oriented presentations to an audience themselves. Students are also introduced to aspects of the culture and lifestyle of Latin Americans to help them adjust to life abroad.

5.2 Course content

In addition to a review of grammar, students receive an introduction to mathematics and materials science on a foreign language basis, as well as the vocabulary of technical terms relevant to them. Also important is the examination of graphs and diagrams and how to describe them.
An introduction to the structure and methods of presentations in the foreign language as well as elaborating and giving these presentations in front of an audience offer the students the opportunity to apply what they have learned.
Furthermore, students learn how to describe technical processes and correlations in the foreign language.
By means of texts and documents as well as foreign-language audio and video material, the ability to extract the relevant information from the aforementioned media and to present it orally and in writing is also trained.
All this enables the students to acquire a basic stock of specific technical vocabulary regarding the various fields of application relevant in the context of engineering.
Students are also introduced to the culture and way of life of Latin Americans so that they can easily find their way around.
In addition to giving presentations, participation in meetings and technical discussions serve the active language acquisition, so that the professionalization phase is thus initiated.
→ 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 this Spanish course, which runs for two semesters, you prepare for your study abroad period, focusing especially on engineering vocabulary.

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: ….)*

B1 - Level of the European Framework of Reference for Languages

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

Passing the cumulative module examination
The points achieved for the oral presentation and the points achieved from the written exam are added up. The sum of the points achieved in both parts of the examination is then used to calculate the module grade

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

Cumulative module examination with points from two examination parts:
1st examination part (50%): oral presentation
2nd examination part (50%): written exam

6.4 Requirements for admission to examination

Regular and active participation, successful presentation

6.5 Module mark weighting for calculating final grade

*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: Spanish**

7.2 Module Contact Person:

Julia Gockel M.A.

7.3 Professors (optional):

Julia Gockel M.A.

7.4 Maximum number of participants (optional)

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

Spanish for Engineering and Latin American Culture 2

1	**1.1 Title of module (GER / ENG)** **Spanisch für Ingenieurwissenschaften und Kultur Lateinamerikas 2 /** **Spanish for Engineering and Latin American Culture 2**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **ITB.1.0176**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**4**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)		

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)	Seminaristic Lecture / Exercise	**4**	**60**	**150**	**5**
	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, follow-up work, preparation for the 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 should be able to meet the B2 level of the European Framework of Reference for Languages in order to be able to apply it in their field and continue their studies abroad. Students will be proficient in the vocabulary concerning the engineering context. They will be able to understand technical presentations, actively participate in technical discussions and also give technically oriented presentations to an audience themselves. Students are also introduced to aspects of the culture and lifestyle of Latin Americans to help them adjust to life abroad.

5.2 Course content

The repetition of individual grammatical topics as well as the extension of the basic stock of specific technical vocabulary regarding the various fields of application relevant in the context of engineering is the subject of the second course.
In addition to dealing with selected economic topics such as marketing and various management areas, the students' written and oral correspondence skills are also promoted and they are trained in applying for jobs in the foreign language.
By means of texts and documents as well as foreign-language audio and video material, the ability to extract the relevant information from the above-mentioned media and to present it orally and in writing is also continued to be trained.
In addition, the students take a close look at international markets, cultural characteristics and the topic of sustainability.
With regard to active language acquisition, in addition to giving presentations, special attention is paid to the participation in meetings and negotiation situations, as well as taking the oral examination, so that the professionalization phase is rounded off and there is nothing standing in the way of studying abroad.

→ 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.

Regular repetition enables you to consolidate your knowledge of grammar. But most importantly, you continuously develop your written and oral communication skills by means of practical exercises and presentations.

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: ….)*

B1 - Level of the European Framework of Reference for Languages
B1 - Niveau des europäischen Referenzrahmens

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

Passing the cumulative module examination
The points achieved for the oral presentation and the points achieved from the written exam are added up. The sum of the points achieved in both parts of the examination is then used to calculate the module grade.

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

Cumulative module examination with points from two examination parts:
1st examination part (50%): oral presentation
2nd examination part (50%): oral exam

6.4 Requirements for admission to examination

Regular and active participation, successful presentation

6.5 Module mark weighting for calculating final grade

*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: Spanish**

7.2 Module Contact Person:
Julia Gockel M.A.

7.3 Professors (optional):
Julia Gockel M.A.

7.4 Maximum number of participants (optional)

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

Statics

1	1.1 Title of module (GER / ENG) **Statik / Statics**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0113**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**1**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**1**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**1**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**1**
	Computer Science in Mechanical Engineering	**C**	**1**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**1**
	Mechanical Engineering (dual study)	**C**	**1**

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**	**150**	**5**
	Exercise	**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, follow-up work, preparation for the 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 demonstrate the principal methodology for solving static problems. They will be able to examine plane and spatial power systems using rigid bodies. They will be able to determine loads at points of support, in connections, and inside components and assemblies. Students will be able to derive abstract mechanical models from practice-related problems of mechanical engineering, and to interpret and critically assess their own results.
The specialist solution strategies gained are the basis for understanding advanced study elements, and can be transferred to related subjects. In addition, they are an essential

precondition for enabling students to address construction design problems in their later professional environment.

5.2 Course content

- **Central, plane and spatial power systems**
- **General, plane and spatial power systems**
- **Momentum**
- **Resultants of a plane and spatial group of forces**
- **Equilibrium in plane and spatial cases**
- **Centre of gravity, line loads**
- **Systems of rigid bodies**
- **Stress resultants on plane and spatial beams, frames and arches**
- **Static and dynamic friction**
- **Simple trusses**

→ 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 do forces act on solid bodies, and how can you calculate them? You practise applying mechanical principles to technical problems, enabling you to solve them. In the process, you gain important basic knowledge for your further 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:

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;
Dankert, H. / Dankert, J.: Technische Mechanik, Teubner Verlag

Steam and Gas Turbines
(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Dampf- / Gasturbinen / Steam and Gas Turbines**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0162**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology (General Mechanical Engineering)	**CE**	**5**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**WiSe**

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	**4**	**60**	**150**	**5**
	Exercise	**1**	**15**		
	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, follow-up work				
	preparation for the examination				
	Total		Total non-contact hours **60**		

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 problems from the field of steam and gas turbines to energy issues and applications. In particular, they will be able to understand and assess the different technical designs of steam and gas turbines. Students will also be able to solve special tasks related to the design of thermal turbomachinery.
The practical course enables students to transfer the specialist knowledge gained to tasks relating to the experimental investigation of turbines. 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

- **Overview and classification**
- **Rotor dynamics of turbomachinery**
- **Thermodynamics of turbine processes**
- **Energy conversion in the stage and design of blading**
- **Components of gas and steam turbines**
- **Operational behaviour**
- **Constructed designs**

→ 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 use of turbomachinery determines the efficiency and environmental friendliness of many technical systems. You assess such machinery, enabling you to ultimately choose the right one for a variety of 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)

Written or oral examination

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. a.d. Wiesche

7.3 Professors (optional):

Professor Dr.-Ing. Habil. S. a.d. Wiesche

7.4 Maximum number of participants (optional)

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

Recommended reading:
S. aus der Wiesche, F. Joos (Eds.):
Handbuch Dampfturbinen. Springer-Vieweg, Wiesbaden, 2018

Strength of Materials

1	**1.1 Title of module (GER / ENG)** **Festigkeitslehre /** **Strength of Materials**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0040**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**2**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**2**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**2**
	Computer Science in Mechanical Engineering	**C**	**2**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**2**
	Mechanical Engineering (dual study)	**C**	**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**	**150**	**5**
	Exercise	**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, follow-up work, preparation for the 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 demonstrate the basic methodological approach for solving problems related to mechanics of materials. They will be able to determine tensile and compressive stresses, bending stresses, torsional stresses and transverse shear stresses in building components. Concerning the "buckling" stability problem, students will know how to analyse the actual system, refer to a case of buckling, and calculate the buckling stresses. Students will be able to determine component deformations and formulate deformation approaches in order to investigate

statically indeterminate systems. Students will be able to derive abstract mechanical models from practice-related problems of mechanical engineering, and to interpret and critically assess their own results. They will also be able to name the limitations of the calculation models presented.
The specialist solution strategies gained are the basis for understanding advanced study elements, and can be transferred to related engineering subjects such as machine elements, construction design and finite elements. In addition, they are an essential precondition for enabling students to design machinery and its components correctly in terms of load in their later professional environment.

5.2 Course content

- **Tensile and compressive stresses, surface pressure**
- **Bar deformations, statically indeterminate bar systems**
- **Moments of inertia of area**
- **Straight and general bending**
- **Bending line, statically indeterminate supported cantilevers**
- **Torsion of circular and circular-ring cross-sections**
- **Torsion of open and closed thin-walled cross-sections**
- **Transverse shear stress of the full cross-section and of thin-walled cross-sections**
- **Shear centre**
- **Uniaxial and multiaxial stress and deformation states, influence of temperature**
- **Composite stresses**
- **Euler buckling cases, buckling theory according to Tetmajer**

→ 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 expand your knowledge of statics to include more complex mechanical relationships. You learn about the conditions causing stresses or the deformation of building components.

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. 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;
Dankert, H. / Dankert, J.:
Technische Mechanik, Teubner Verlag

Technical English

1	**1.1 Title of module (GER / ENG)** **Technisches Englisch /** **Technical English**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **ITB.1.0106**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C**	**2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**5**
	Computer Science in Mechanical Engineering	**C**	**5**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**2**
	Mechanical Engineering (dual study)	**C**	**6**

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)	Seminar / Exercise	**4**	**60**	**150**	**5**
	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, follow-up work, preparation for the examination		**60**		
	e-learning		**30**		
	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?)

Professional competence:

After participating in the module, the students are able to master the language competence of the B2 level of the Common European Framework of Reference. They should also be able to independently present professional content and technical matters in the foreign language appropriately, present them professionally and discuss them in an academic context.

Methodological competence:

After participating in the module, the students can systematically grasp, structure, analyse, and present a target group-specific context as part of the in-depth study of a question or a topic. The students can also apply scientific work target-specific techniques.

Social competence:

After participating in the module, the students are able to work on a specific topic in a cooperative and responsible manner and to present subject-related content suitable for the target group. Different communicative settings encourage the students to work in a team and actively engage in dialogues.

Self-competence:

After participating in the module, the students can better recognize and reflect their personal linguistic abilities in the foreign language. This helps them to further consolidate and professionalise their linguistic competence.

5.2 Course content

Using texts, technical documents, audio and video materials in the target language, technical aspects are illustrated and discussed. Technical processes are described and context-specific terminology is introduced and applied in different scenarios.

Working on presentations and project descriptions as well as dealing with technical questions and problems support the active language acquisition. This also contributes to the overall professionalisation of the language competencies. Students can bring in their own technical knowledge based on their field of studies when giving presentations.

Next to the acquisition of technical and academic vocabulary, statistical depictions are described and analysed, professional presentation skills are taught and refined, reading and writing skills are applied. Context related grammar is revised if needed.

→ 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.

English is the lingua franca of science; it can also be a door opener at work. You add technical terminology to your vocabulary, and use it in presentations and project descriptions.

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 B1 level (Common European Framework of Reference)

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
English: Regular participation in class and completion of preliminary 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:

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

7.3 Professors (optional):

English: 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.)

Technical English (B2) and Communication

(Module **not** valid for enrolment from WiSe 21/22 onwards)

1	1.1 Title of module (GER / ENG) **Technisches Englisch (B2) und Kommunikation / Technical English (B2) and Communication**	1.2 Short description (optional)	1.3 Module code (from HIO) **ITB.1.0172**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology (General Mechanical Engineering)	**C**	**3**
	Computer Science in Mechanical Engineering	**C**	**3**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**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)	Seminaristic Lecture / English + Communication	**3+2**	**75**	**150**	**5**
	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, follow-up work, preparation for the examination		**60**		
	e-learning		**15**		
	Total		Total non-contact hours **75**		

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 this module, students will be able to present freely image-based specialist presentations, project descriptions and group work in both German and English, and to consciously apply rhetorical and audience-oriented methods. They will be able to use specialist terms to describe and explain technical processes in both languages. In discussions and talks, they will be able to respectfully ask and answer questions, and represent their own opinion argumentatively. They will be able to write professional reports and emails with confidence, in terms of form and style. Self-assurance and self-confidence for everyday study and working practices will be trained in practice. Preparation techniques and an introduction to literature search and citation promote academic writing across modules. Particularly by exchanging technical content with international students, students develop the skills required to use English – the common language of industry.

5.2 Course content

Communication: Language and speaking, presentation and rhetorical skills, presentation using technical aids, argumentation and debate, prompting techniques, conversational skills, literature search and citation.
English: Core areas of the subject of Mechanical Engineering, complemented by selected Business English modules (Presentations, Negotiations, Meetings)

→ 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.

At university and at work, you learn and work with other people across geographical and linguistic boundaries – whether in team projects or presentations. You therefore practise your argumentation and presentation skills in German and English.

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 B1)

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)

Examination element for English: Written or oral examination (60%)
Examination element for Communication: semi-public talk using presentation software (40%)

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
English: Regular participation in class and completion of preliminary work
Communication: Regular participation in class

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:

English: H. Ermen M.A., J.-C. A. Gockel M.A., Dr. A. Hövener M.A.
Communication: Lecturer - Dr. S. Schiller-Lerg

7.3 Professors (optional):

English: H. Ermen M.A., J.-C. A. Gockel M.A., Dr. A. Hövener M.A.
Communication: Lecturer - Dr. S. Schiller-Lerg

7.4 Maximum number of participants (optional)

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

Technical Project 1

1	**1.1 Title of module (GER / ENG)** **Technisches Projekt 1 /** **Technical Project 1**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0185**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. or 2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4. or 5.**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4. or 5.**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4. or 5.**
	Computer Science in Mechanical Engineering	**CE**	**4. or 5.**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4. or 5.**
	Mechanical Engineering (dual study)	**CE**	**SuSe or WiSe**

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)				**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, follow-up work, written elaboration		**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?)

Students should be able to independently develop solutions for a specific task in mechanical engineering using tools and methods that are adequate for engineering purposes. They will improve their personality skills and methodological skills by presenting the intermediate results.

5.2 Course content

Cross-module task from the subject areas of the degree programme, either from industry or the university.

→ 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 a company, you focus intensively on a practice-oriented task, giving you the opportunity to gain valuable professional experience. You present your interim results on a regular basis, helping you to improve your presentation skills.

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)

Set by person responsible for the module

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:

Depending on offer

7.3 Professors (optional):

Depending on offer

7.4 Maximum number of participants (optional)

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

Technical Project 2

1	**1.1 Title of module (GER / ENG)** **Technisches Projekt 2 /** **Technical Project 2**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0186**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**CE**	**1. or 2. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4. or 5.**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4. or 5.**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4. or 5.**
	Computer Science in Mechanical Engineering	**CE**	**4. or 5.**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4. or 5.**
	Mechanical Engineering (dual study)	**CE**	**SuSe or WiSe**

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)				**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, follow-up work, written elaboration		**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?)

Students should be able to independently develop solutions for a specific task in mechanical engineering using tools and methods that are adequate for engineering purposes. They will improve their personality skills and methodological skills by presenting the intermediate results.

5.2 Course content

Cross-module task from the subject areas of the degree programme, either from industry or the university.

→ 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 a company, you focus intensively on a practice-oriented task, giving you the opportunity to gain valuable professional experience. You present your interim results on a regular basis, helping you to improve your presentation skills.

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)

Set by person responsible for the module

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:

Depending on offer

7.3 Professors (optional):

Depending on offer

7.4 Maximum number of participants (optional)

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

Thermodynamics

	1.1 Title of module (GER / ENG)	1.2 Short description (optional)	1.3 Module code (from HIO)
1	**Thermodynamik / Thermodynamics**		**MB.1.0129**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)	**C**	**3**
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**3**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**3**
	Computer Science in Mechanical Engineering		
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**C**	**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**	**150**	**5**
	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, follow-up work, written elaboration		**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 related to the fundamentals of thermodynamics, and to transfer them to practical engineering applications. In particular, they will be able to understand and assess the different thermodynamic concepts of systems and components. Students will be able to solve special tasks relating to power engineering and other typical application cases.

5.2 Course content

- **Basic concepts of thermodynamics**
- **Thermodynamic behaviour of fluids**
- **The main laws of thermodynamics**
- **Thermodynamic cycles and changes of state**
- **Selected 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.

You explore the conversion of the different kinds of energy, which is important in the design, calculation and analysis of machines and systems. You gain a basic understanding of thermal processes in a wide range od technical 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. habil. S. aus der Wiesche / Professor Dr.-Ing. J. Scholz

7.3 Professors (optional):

Professor Dr.-Ing. habil. S. aus der Wiesche / 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: Lecture notes;

Baehr, Kabelac:

Thermodynamik, Springer-Verlag, Berlin

Thermofluiddynamics

1	**1.1 Title of module (GER / ENG)** **Thermofluiddynamik / Thermofluiddynamics**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0194**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering		
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering		
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology		
	Computer Science in Mechanical Engineering	**C**	**3**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**3**
	Mechanical Engineering (dual study)		

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**	**150**	**5**
	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, follow-up work, written elaboration		**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 related to the fundamentals of thermodynamics and fluid mechanics, and to transfer them into practical engineering applications. In particular, they will be able to understand and assess the different thermodynamical and fluid mechanical concepts for systems and components. In the practical course, the the students can apply their theoretical knowledge in experiments. The work in small groups and the preparation of reports and presentations enhance their communication and social skills, too.

5.2 Course content

- **Fundamentals in Thermodynamics and Fluid Mechanics**
- **Thermophysical Properties of Fluids and Equation of State**
- **Balance Equations**
- **Perfect Gas**
- **Cycles and Thermodynamics of Engines**
- **Steady-Flow Processes**
- **Euler-Theory (Fundamentals of Turbomachinery)**
- **Flow Past Bodies and Basic Phenomena**
- **Dimensional Analysis and Similitude**

→ 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, which is important in the design, calculation and analysis of machines and systems. You gain a basic understanding of thermodynamics and fluid mechanics of turbomachinery and other 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. 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.)

Literature:

Special lecture material and information; Baehr, Thermodynamik, Springer; Granger, Hydrodynamics, Dover; White, Fluid Mechanics, McGraw-Hill

Think Tank (Kooperation mit FB MSH, MSD, MSB)

1	1.1 Title of module (GER / ENG) **Ideenschmiede / Think Tank**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0189**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)		
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4 and 5**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4 and 5**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4 and 5**
	Computer Science in Mechanical Engineering	**CE**	**4 and 5**
	Business Administration & Engineering majoring in Mechanical Engineering	**CE**	**4 and 5**
	Mechanical Engineering (dual study)	**CE**	**7 and 8**

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**	**150**	**5**
	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, follow-up work, preparation for the examination		**75**		
	Total		Total non-contact hours **75**		

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 participating in this module, students should be able to create an innovative entrepreneurial response to a real-world challenge using the knowledge and skills developed in this course, other courses you have taken, and your experiences by:

1. Knowledge about prototyping of business ideas / concepts made during the module
2. Understand the concepts of entrepreneurship, startups, customer-focused design, technology-driven innovation and sustainable entrepreneurship.
3. Apply innovation methods like Design Thinking, Business Model Canvas, and Lean Startup.

4. Identify customers (B2B and B2C) and integrate their needs into an entrepreneurial concept.
5. Apply validation techniques to make data-driven decisions about business model design, product/service design, and the startup process.
6. Integrate basic marketing principles for start-ups, including mapping and assessment of main competitors, segmenting, selection of distribution channels and branding.
7. Apply basic financial components of startups, including revenue models, cost structure, and pricing.
8. Compellingly deliver business ideas to investors, partners, and other stakeholders.
9. Work effectively in interdisciplinary and intercultural teams.
10. Learn about sustainable business models and how sustainability and entrepreneurship can be closely aligned

5.2 Course content

This project aims at creating and commercializing a product and/or service in the mobility and inclusion space by tackling the challenge of facilitating/improving the lives of people in wheelchairs. we are very excited to bring students and professors from the FH Münster School of Business (MSB), Münster School of Design (MSD), Münster School of Health (MSH), and Engineering (MB) together to work in a real-life interdisciplinary context. The project focuses on developing a product and/or service idea, along with a startup plan and business model that uses our tools to try and grow an emerging business.

In this project, the goal will be to enhance and apply knowledge within your study program but also to learn how to work effectively with people from other disciplines.

Course Format:

We will meet on Teams all semester. The students from MSB, (MSD) and MB will all start at the same time, while the students from MSH will join the course later on. We will use our time together to help you identify and build a set of interdisciplinary competencies, that you can individually select and focus on. You will have an opportunity to learn and apply these competencies through a very applied entrepreneurial team project. The course is divided into three different learning formats:

1) Input sessions for all participants: will provide the students with all relevant definitions, methods, and tools. We won't spend a lot of time lecturing, but when we do, it will be related to this core knowledge, and we will try to use lots of interesting examples and mix in discussion questions to help you learn.

2) Individual team work sessions: will provide the students time to work on their project based on the learnings from the input sessions.

3) Coaching sessions: lead by WHKs from the respective faculty: are voluntary and designed to help the students with regards to questions that might arise. These are hands-on, structured activities where you learn 'by doing' about entrepreneurial thinking (creativity, innovation, iteration) and skills (ideation, validation, financial analysis) and can practice the tools we teach you.

With these three different learning formats, this course is designed to immerse you in the knowledge and skills that support successful interdisciplinary and entrepreneurial work. This is NOT a class where you take your own idea and at the end of 15 weeks, you have a startup. While failure is a great learning experience, research and our experience shows that this approach is not the best way to learn to be a successful entrepreneur in a university setting. Rather, we will take a more guided approach that provides students with some core knowledge about entrepreneurship, some important skills, and a chance to practice those skills in a very real, but controlled, project environment.

→ 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 this project, the goal is to enhance and apply knowledge within your study program but also to learn how to work effectively with people from other disciplines and departments. The course focusses on developing a product or a service idea for a special headline giving at the beginning of the course.

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)

You have three deliverables this semester, worth in total, 100 points:

Deliverable 1: Group assignment, worth 30 points:

Blueprint-Portfolio of tools used that helped your team when creating your business idea. Take pictures or screen shots of all your work, notes, drawings etc. and briefly comment on those to explain their purpose.

Deliverable 2: Group assignment, worth 50 points:

Team Presentation: Pitching your business ideas. The presentations will be 15 minutes long with 5 minutes Q&A. All students will have to deliver a roughly equal part of the presentation. We will aim for 4-5 students per team.

Deliverable 3: Individual assignment, worth 20 points:

Reflection paper, summarizing what you learned and how it relates to your intended career path, by addressing these three issues:

I. Three important skills or pieces of knowledge you learned about entrepreneurship and/or innovation - apply course concepts and at least one concept from the assigned articles.

II. An assessment of how your team performed. Did everyone contribute equally? Was your team process functional and smooth?

III. Two actions you would take differently next time (or put differently, what advice would you give next semesters' students based on your experience?)

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 in Kooperation mit den beteiligten Professoren

7.4 Maximum number of participants (optional)

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

Virtual Reality in factory planning

1	1.1 Title of module (GER / ENG) **Virtual Reality in der Fabrikplanung / Virtual Reality in factory planning**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0201**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings), EGU + ETI	**CE**	**1. GS**
	Mechanical Engineering - Specialisation in Plant Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**CE**	**4**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**CE**	**4**
	Computer Science in Mechanical Engineering	**CE**	**4**
	Business Administration & Engineering majoring in Mechanical Engineering		
	Mechanical Engineering (dual study)	**CE**	**SuSe**

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	**1**	**15**	**150**	**5**
	Exercise	**1**	**15**		
	Practical course	**2**	**30**		
	Total	Total contact hours in SWS **4**	Total contact hours in hours **60**		
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)	Preparation, follow-up work, preparation for the examination Elaboration of project work		**45** **45**		
	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?)

Developed professional competence: **The students know the status of the development and use of virtual reality techniques. They have an overview of important technical systems (e.g. VR software, VR glasses, VR projection systems such as power walls), can classify them and use them for practical applications. In addition, they can assess the suitability of virtual reality for modern engineering requirements in various disciplines (mechanical engineering, automation technology, building services engineering, energy technology, logistics, etc.) and critically evaluate it from both a technical and an economic perspective. The students plan and document an interdisciplinary, industry-related project independently in teams and carry it out. They communicate about specialist content within the framework of the project in German and, if necessary, in English.**

Developed social competence: **The students develop teamwork and communication skills. They can deal with conflicts in small international work teams so that they are able to solve interdisciplinary project tasks.**

Developed self-competence: **The students are able to work out technical/scientific content independently and in a well-organized manner for the preparation and follow-up of projects. In terms of content, they make use of German and, if necessary, English documents.**

Developed methodological competence: **The students increase their ability to concentrate in lectures through focused listening over longer periods of time. They train their memory by taking notes by hand and are able to filter out essential content. They are able to independently acquire, prepare and present subject knowledge within the framework of seminar-style lessons. In doing so, they also make use of foreign-language specialist literature if necessary. In addition, through practical project work with a VR software tool, they can plan, carry out, simulate and evaluate industry-related practical projects and technical processe. They can record, explain and summaries them scientifically correctly in writing.**

5.2 Course content

The students design virtual worlds and interactions. They learn the practical handling of a VR software tool. They also take into account perception aspects and know how to use the relevant input and output techniques. They specifically use VR glasses in the context of the VR software tool used. They plan and realize industrial (sub-) projects with the inclusion of "Virtual Reality". Suitable case studies from industry are shown for this purpose.

→ Details available in the university ca*lend*ar, 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 the module "Virtual Reality", students design virtual worlds and interactions and use VR glasses specifically with the VR software tool used. They plan and realize (partial) industrial 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)

Creation and documentation of a factory design with the VR software tool

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Regular and active participation in the seminaristic lecture and seminar lessons, successful completion of the project 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:

Dean Prof. Dr. rer. nat. E. Finke

7.3 Professors (optional):

Lecturer Dipl.-Ing. H. Beesten

7.4 Maximum number of participants (optional)

12 Persons (20 persons in case of group formation)

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

Bachelor - Practical modules

Practical Project
(Admission with passed "Communication" in the 2nd/3rd semester)

1	1.1 Title of module (GER / ENG) **Praxisphase / Practical Project**	1.2 Short description (optional)	1.3 Module code (from HIO) **MB.1.0095 / MB.1.0096 / MB.1.0097**
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:
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C**	**8. / 9.**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**6**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**6**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**6**
	Computer Science in Mechanical Engineering	**C**	**6**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**6**
	Mechanical Engineering (dual study)	**C**	**9**

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)					
	Total	Total contact hours in SWS	Total contact hours in hours	**450**	**15**
Non-contact hours (e.g. tutorial, preparation, follow-up work, preparation for assignments and homework, research, etc.)					
	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 of the module, students will be able to better assess their future professional work by performing specific tasks and undertaking practical work in companies. In particular, students will be able to apply the knowledge and skills gained previously on the study programme, and to reflect on and assess the insights and experience gained in the process. By socially interacting in the company, students are able to hone their communication skills, their ability to deal with conflict, and their capacity for teamwork. Moreover, they will master the basics of scientific literature search. Students will be able to recognise and formulate information requirements. Building on this, they will be

able to gain access to the necessary information, select and assess appropriate sources, and present the results gained to suit the target group. Besides preparing students for their Bachelor thesis, which requires to use scientific literature, the module also prepares them for professional information providing in their career.

5.2 Course content

Practice-based tasks in industrial and craft business.

→ 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.

Get an insight into the working world: during the practical phase, lasting twelve weeks at most, you experience day-to-day work in mechanical engineering at first hand. You are given a certificate at the end.

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
Confirmation of participation in the online course "Information Literacy"
Module „Communication" of the 2nd / 3rd semester needs to be passed

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

Qualifying certificate issued by the industrial company
Confirmation of participation in the online course "Information Literacy"
Passing the „Communication" exam oft he 2nd /3rd semester.

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

None

6.4 Requirements for admission to examination

See current version of the Examination Regulations / special examination rules and regulations
Practice-based tasks in industrial and manual settings.

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:

The Dean

7.3 Professors (optional):

7.4 Maximum number of participants (optional)

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

Material to accompany the online course "Information Literacy"

Bachelor Thesis

1	**1.1 Title of module (GER / ENG)** **Bachelorarbeit /** **Bachelor Thesis**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0001 – MB.1.0009** **MB.1.0015 – MB.1.0016**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C**	**8. / 9.**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**6**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**6**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**6**
	Computer Science in Mechanical Engineering	**C**	**6**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**6**
	Mechanical Engineering (dual study)	**C**	**9**

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)				**360**	**12**
	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.)					
	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 preparation, students will be able to independently tackle a practice-based question from the subject area of mechanical engineering, both as regards details of the subject and interdisciplinary contexts, within a set period. In particular, they will be able to independently apply practical and scientific methods, and to transfer them to the specific question. Students will be able to present the results in an appropriate and structured manner in a written paper.
The skills gained whilst completing the Bachelor thesis prepare students for a career in industry or for a postgraduate Master's programme.

5.2 Course content

Practice-based task from the subject area of the degree programme; the thesis is usually conducted in an industrial setting.

→ 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.

Your Bachelor's thesis demonstrates your ability to independently apply the knowledge gained from your studies. You address a practice-related question in an academically sound manner, making confident use of the relevant methods.

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:

The Dean

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)** **Kollquium /** **Colloquium**	**1.2 Short description (optional)**	**1.3 Module code** (from HIO) **MB.1.0064 – MB.1.0074**
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:**
	Bachelor`s programmes:		
	Mechanical Engineering - International Engineering (Outgoings)		
	Mechanical Engineering - International Engineering (Incomings)	**C**	**8. / 9.**
	Mechanical Engineering - Specialisation in Plant Engineering	**C**	**6**
	Mechanical Engineering - Specialisation in Automotive and Drive Engineering	**C**	**6**
	Mechanical Engineering - Specialisation in Construction and Manufactoring Technology	**C**	**6**
	Computer Science in Mechanical Engineering	**C**	**6**
	Business Administration & Engineering majoring in Mechanical Engineering	**C**	**6**
	Mechanical Engineering (dual study)	**C**	**9**

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)				**90**	**3**
	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.)					
	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?)

In the colloquium, students demonstrate their ability to present, orally explain and independently substantiate before a specialist audience the results of their Bachelor thesis, its specialist and methodological foundations, 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

Building on the student's Bachelor 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.

The Bachelor's colloquium (oral exam) involves you orally presenting the results of your thesis. You give reasons for the approach you took, and explain interdisciplinary relationships. You also assess the significance of your thesis for practice.

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 maximum 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:

The Dean

7.3 Professors (optional):

7.4 Maximum number of participants (optional)

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