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Please note that only the German version of the modules is official and legally binding. The English version is for infor	mative purposes only.	

Module Descriptions for the professional field of Metals Technology in the Bachelor Degree Course PBE EM

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Module	e code	Mathem	atics			1 st + 2 nd sem.	12 CP
Bachelor Professional and Business Education							
Module	Module Mathematics 1 and 2						
Faculty	/Subject/Department	University of applied sciences: Faculty 06/MNI					
Associa	ssociated degree Bachelor PBE, 1 st + 2 nd semester						
course,	burse/Semester taken						
Module	e coordinator	ct. Germ	an version				
Prereq	uisites	None					
Learning outcomes	The students are familiar with the command of systema ability to confidently command of the func ability to exponentiat command of the func variables and ability t are familiar with the	fundamentals of vector algebra and have the ability to apply these atic solving of linear. equation systems handle elemental functions damental rules of differential and integral calculus of a variable and ability to apply these te and to extract a root in a complex area damental terms and rules of differential and integral calculus of multiple to apply these fundamental terms of lines and have the ability to deal with					
Module contents	 Fundamentals (sets, Vector algebra, linea Elemental functions Limit values Differential calculus of Integral calculus of a Powers and roots of Differential calculus of Integral calculus of m Lines and line integral 	real and complex numbers, (in)equations) r equation systems of a variable variable complex numbers of multiple variables nultiple variables					
Percen form(s)	tage share of instruction)	2 lecture	s 67%/2 tutorials 3	33%			
	Total workload	360 hour	s = 12 ECTS credits	(1 ECTS = 30	hours)		
n hours	a Course type and title	A co a contact hours	urses b preparation/ revision, module-componen examination	B auto- nomous work t	C examination incl. prepara	tion Sum	
adi	L Mathematics 1	60	30	15	15	120	
rko		20	20			60	
Ň		50	30			00	
_	L Mathematics 2	60	30	15	15	120	
	T Tutorials 2	30	30			60	
	Sum	180	120	30	30	360	
	Prerequisite(s) for examination	1. 2. 9	Regular and active Successful complet	participation i ion of homew	n courses ork		
Module examination	Form(s) of assessment (scope) module-component	1. 2. Students passed, a examinat minutes). the stude compone	 Successful completion of homework Examination of lecture 1 (90 min.) Examination of lecture 2 (90 min.) Students must pass both examinations. If the module-component examination is not passed, a retake examination will take place. The student may partake in the retake examination if less than 5 credits were awarded in the first examination (max. 90 minutes). If more than one part of the module-component examination is not passed, the student is required to participate in a retake examination in each of the module- 				

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	Contribution to final mark	50% examination 1 and 50% examination 2			
	Retake examination	Examination (90 min.)			
Frequer	псу	Every semester duration: 2 semesters			
Intake capacity		Lecture: unlimited (capacity of lecture hall), tutorials: 35 per tutorial			
Languag	ge of instruction	German			
Additio	nal information:	Guidance on module and required literature: see notice board/date: see course catalogue			

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Please note	that only the German version of the mo	dules is official and legally binding. The English version is for informative purpo	ses only.		
Module	e code	Technical Mechanics	1st + 2nd sem.	10 CP	
Bachelo	Bachelor Professional and Business Education				
Module	2	Technical Mechanics 1 and 2			
Faculty	/Subject/Department	University of applied sciences: Faculty 03/MMEW			
Associa course/	Associated degree Bachelor PBE, 1 st + 2 nd semester				
Module	e coordinator	cf. German version			
Prerequ	uisites	None			
Learning outcomes	The students are familiar with tanalysis and have are proficient in tane familiar with tane band the band torque 	he fundamental laws of stress analysis and dimensioni the ability to apply these, ne use of the linear beam theory, he fundamental laws of torsion and buckling and have asic method of structural analysis of mechanical engine ts in equilibrium systems	ng as well as of load cap the ability to apply the eering constructions	bacity se,	
Module contents	 Calculation of the centre of gravity Stress resultants in slender components Member forces in constructions Friction Stresses and distortions Tensile stress, bending stress and torsional loading Pressure loading and buckling Plane state of stress Strength hypotheses Three-dimensional state of stress 				
Percent form(s)	tage share of instruction	2 lectures 67%/2 tutorials 33%			
in hours	Total workload Type and title of course	300 hours = 10 ECTS credits A courses B auto- C examinal contact b preparation/ nomous incl. pre hours revision work module-component examination examination examination	tion paration Sum		
oad	L Engineering Mechanics 1 60 40 100				
ork	र्हे T Calculation tutorial 30 20 50				
3	L Engineering Mechanics	2 60 40	100		
	T Calculation tutorial	30 20	50		
	Sum	180 120	300		
le le exami	Prerequisite(s) for examination	Regular and active participation in courses			

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	Form(s) of assessment (scope)	 Examination for lecture 1 (90 min.) Examination for lecture 2 (90 min.) 		
module-component		Students must pass both examinations. If the module-component examination is not passed, a retake examination will take place. The student may partake in the retake examination if less than 5 credits were awarded in the first examination (max. 90 minutes). If more than one part of the module-component examination is not passed, the student is required to participate in a retake examination in each of the module-components not passed (max. 90 minutes).		
	Contribution to final mark	50% examination 1 and 50% examination 2		
	Retake examination	Examination (90 min.)		
Freque	псу	Every semester duration: 2 semesters		
Intake o	capacity	Lecture and tutorial: unlimited (capacity of lecture hall)		
Language of instruction		German		
Additional information:		Guidance on module and required literature: see notice board/date: see course catalogue		

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Module	e code	TD/CAD		2 nd sem.	4 CP
Bachelo	or	Professional and Business Educ	cation		
Module	2	TD/CAD			
Faculty	/Subject/Department	University of applied sciences:	Faculty 03/MMEW		
Associa	ted degree	Bachelor PBE, 2 nd semester			
course/	'Semester taken				
Module	e coordinator	cf. German version			
Prerequ	uisites	None			
Learning outcomes	 design methodolo use technical drav use digitalize d co 	e ability to ogically with the help of compute vings as a communication metho mponent information from vario	er aided tools, od for technical informati ous sources of data	on,	
e ts	Rules concerning	the realization of technical draw	ings		
nten of odul	 Functions and pot Composition of get 	centialities of a design software			
u Cor	 Interfaces, data tr 	ansfer			
E a mar (a)) of in struction				
Percent		1 lecture 40%/1 tutorial 60%			
rereem	Total workload	120 hours - 4 ECTS credits			
Jours	a Course type and title	A courses B a contact b preparation/ hours revision, w module-component	auto- C examinatio nomous incl. prepa ork	n ration	
int		examination		Sum	
rkload	L Lecture TD/CAD	30	10	40	
Ň	LT Laboratory tutorials	45		45	
	FD Final design assignment	5	30	35	
	Sum	80	30 10	120	
5	Prerequisite(s) for examination	Regular and active participation	n in courses		
xaminatio	Form(s) of assessment (scope)	1. L: Technical discussion (oral of 2. LT: 5 drawings	examination) concerning	all branches	
le e	module-component	22.20/ technical discussion 22.2	20/ drawings 22 20/ final	design assignment	
Modu	Retake examination	Each module-component exam Individual assessment items ca	ination must be passed. n be retaken.		
Frequer	Су	Every semester duration: 1 semester			
		winter semester: lecture + lab t summer semester: lecture + lab	utorial o tutorial		
Intake c	apacity	Lecture: unlimited (capacity of laboratory tutorial and seminar	lecture hall), :: 70 students each		
Languag	ge of instruction	German			
Addition	nal information	Guidance on module and requi catalogue	red literature:: see notice	board/date: see cou	rse

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					nd rd	
Module	e code	Machine	e Elements		$2^{10} + 3^{10}$ sem.	12 CP
Bachelo	or	Professi	onal and Business Educatio	n		
Module	2	Machin	e Elements 1 and 2			
Faculty	/Subject/Department	Universi	ty of applied sciences: Facu	ilty 03/MMEW		
Associa course/	ted degree ′Semester taken	Bachelo	r PBE, 2 ^m + 3 ^m semester			
Module	e coordinator	cf. Gern	an version			
Prerequ	uisites	None				
Learning outcomes	The students are familiar with t these, are proficient in to are familiar with r should have the a 	he princip echnical d naterials bility to ti	ples and correlations of eng rawing and CAD, engineering and manufactu ransfer and apply the acqui	ineering mechanics a iring technology and red knowledge from	nd have the ability t Machine Elements 1	o apply
Contents of module	 Calculation and de Welds, bonds, braaxes/shafts, sprin Static and dynami Force, torque, stra Load, fatigue stre Lubricants, frictio Gaskets, clutches, 	esign of: Ized joints gs. ic loads: ain, defor ngth, criti n bearing chain dri	mation, vibration, notch ef cal speed of rotation, s, antifriction bearings, gea ves, belt drives	, compression mould: fect. rs,	s, shaft-hub connect	ions,
Percent form(s)	tage share of instruction	2 lecture	es: 50%/2 tutorials: 25%/de	esign assignment 1 an	d 2: 25%	
	Total workload a Course type and title	360 hou A co contact hours	rs = 12 ECTS credits burses B auto- b preparation/ nom- revision, work	- C examination ous incl. prepara	n ation	
Workload in hours	L Lecture Machine Elemen T Calculation tutorials 1 D Design assignment 1 L Lecture Machine Elemen T Calculation tutorials 2 D Design assignment 2 Sum	ts 1 45 15 20 ts 2 45 15 20 160	module-component examination 40 15 30 40 15 30 15 30 170	15 15 30	Sum 100 30 50 100 30 50 360	
ion Workload in hours	L Lecture Machine Elemen T Calculation tutorials 1 D Design assignment 1 L Lecture Machine Elemen T Calculation tutorials 2 D Design assignment 2 Sum Prerequisite(s) for examination Form(s) of assessment (comp)	ts 1 45 15 20 ts 2 45 15 20 160 Regular a 1.	module-component examination 40 15 30 40 15 30 15 30 170 and active participation in of Examination of Machine El	15 15 30 courses ements 1 lecture (90	Sum 100 30 50 100 30 50 360 min.)	
Module examination Workload in hours	L Lecture Machine Elemen T Calculation tutorials 1 D Design assignment 1 L Lecture Machine Elemen T Calculation tutorials 2 D Design assignment 2 Sum Prerequisite(s) for examination Form(s) of assessment (scope) module-component	ts 1 45 15 20 ts 2 45 15 20 160 Regular 3 1. 2. Students passed, 3 examina minutes the stud compone	module-component examination 40 15 30 40 15 30 170 and active participation in of Examination of Machine El Examination of Machine El Examination of Machine El Examination of Machine El Examination of Machine El in must pass both examination a retake examination will take tion if less than 5 credits w b. If more than one part of the ent is required to participate ents not passed (max. 90 m	15 15 30 courses ements 1 lecture (90 ements 2 lecture (90 ons. If the module-co onke place. The studen ere awarded in the fin the module-compone te in a retake examina- inutes).	Sum 100 30 50 100 30 50 360 min.) mponent examination t may partake in the rst examination (main nt examination is no ation in each of the n	on is not retake x. 90 t passed, nodule-

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	Retake examination	Written examination (90 min.)			
Frequency		Every semester duration: 2 semesters			
Intake capacity		Lecture and tutorial: unlimited (capacity of lecture hall)			
Language of instruction		German			
Additio	nal information	Guidance on module and required literature:: see notice board/date: see course catalogue			

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Module code		Materials Engineering 1 st sem.						
Bachelo	or	Professional and Business Education						
Module	2	Materials Engineering						
Faculty	/Subject/Department	MMEW						
Associa	ted degree	Bachelor PBE, 1 st semester						
course/	Semester taken							
Module	e coordinator	cf. German version						
Prerequ	uisites	None						
 have the ability to evaluate the mechanical material behaviour of metallic materials under static and dynamic loading, can determine material parameters under static and dynamic loading, can recognize and correlate fracture surfaces of metallic component with the respective failure mechanisms. Ultrasonic testing of components 								
Contents of module	 Stress-strain behaviour of materials Hardness testing Technological testing of materials Behaviour of materials under dynamic loading Non-destructive material testing 							
Percent form(s)	tage share of instruction	Lecture 75%/tutorial 25%						
	Total workload	120 hours = 4 ECTS credits (1 ECTS = 30 hours)						
d in hours	a Course type and title	A courses B auto- C examination a contact b preparation/ nomous incl. preparation hours revision, work module-component examination						
Vorklo	L Lecture Materials Engine	ering 45 15 15	75					
>	LT Laboratory tutorials	15 30	45					
	Sum	60 45 15	120					
nation	Prerequisite(s) for examination	 Regular and active participation in courses Tests on three experiments in the laboratory tutorials Technical report of three experiments in the laboratory tutorials 						
e exami	Form(s) of assessment (scope)	Examination of lecture (90 min.)						
dule	Module examination							
δ	Contribution to final mark	100% examination						
	Retake examination	Examination (90 min.)						
Frequer	ncy	Every semester duration: 1 semester						
Intake c	apacity	Lecture: unlimited (capacity of lecture hall), laboratory	tutorial: 15 students					
Languag	ge of instruction	German						
Addition	nal information	Guidance on module and required literature: see notice board/date: see course catalogue						

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Please note t	ease note that only the German version of the modules is official and legally binding. The English version is for informative purposes only.							
Module	e code	Technical T	hermodynamics			3 rd sem.	4 CP	
Bachelo	or	Professiona	Professional and Business Education					
Module	2	Technical T	hermodynamics	5				
Faculty	/Subject/Department	University of	of applied scienc	es: Faculty 03,	/MMEW			
Associa course/	ted degree 'Semester taken	Bachelor PE	3E, 3 rd semester					
Module	e coordinator	cf. German	version					
Prerequ	uisites	None						
 The students can apply the principles and fundamentals to practical problems related to energy , are familiar with the various operating and cycle processes and have the ability to assess these. 					e.			
Contents of module	 Thermodynamic r First and second I Operating and cyc Gas mixtures and 	c material data d laws of thermodynamics cycle processes nd humid air						
Percent form(s)	tage share of instruction	1 lecture 60%/1 tutorial 40%						
	Total workload	120 hours =	4 ECTS credits	(1 ECTS = 30 h	ours)			
ad in hours	a Course type and title	A cours a contact d hours mc	ses o preparation/ revision, odule-componen examination	B auto- nomous work t	C examination incl. prepar	า ation Sum		
Vorkla	L Lecture Thermodynan	nics 45	15		15	75		
>	LT Laboratory tutorials	30	15			45		
	Sum	75	30		15	120		
tion	Prerequisite(s) for examination	Regular and	active participa	tion in courses	5			
xaminat	Form(s) of assessment (scope)	Examination	n of lecture (90 n	nin.)				
a əlı	Module examination							
lodi	Contribution to final mark	100% exam	ination					
2	Retake examination	Examination	n (90 min.)					
Frequer	псу	Every seme	ster duration:	1 semester				
Intake c	apacity	Lecture: unl each	imited (capacity	of lecture hal), laboratory tu	itorial and seminal	r: 60 students	
Languag	ge of instruction	German						
Additior	nal information	Guidance on module and required literature: see notice board/date: see course catalogue						

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Flease note									
Module	e code	Electrical Engineering 1 ^{or} sem. 4 CP							
Bachelo	or	Professional and Business Education							
Module	2	Electrical Engineering 2							
Faculty	/Subject/Department	University of applied sciences: Faculty 03/MMEW							
Associa	ted degree	Bachelor PBE, 1 st semester							
course/	Semester taken								
Module		cf. German version							
Prerequ	JISITES The students	None							
Learning outcomes	 are familiar with the fundamental laws for describing direct current circuits and networks and have the ability to apply these, are familiar with electric and magnetic fields, are familiar with the fundamental laws for describing alternating current circuits and networks and have the ability to apply these, understand the principal functionality of selected semiconductor devices 								
Contents of module	 Fundamental laws of electrical engineering Direct current circuits, resistor networks Electric and magnetic fields Inductors and capacitors Law of induction Alternating current circuits Three-phase current Fundamentals of semiconductor technology (diodes, transistors) 								
Percentage share of instruction form(s)		Lecture 50%/tutorial 50%							
	Total workload	120 hours = 4 ECTS credits							
ad in hours	a cc Type and title of course	A courses B auto- C examination ontact b preparation/ nomous incl. preparation hours revision, work module-component sum							
ırklo	L Lecture Electrical Engineerir	ng 30 15 15 60							
Ň	T Calculation tutorial	30 30 60							
	Sum	60 45 15 120							
ition	Prerequisite(s) for examination	Regular and active participation in courses							
xamina	Form(s) of assessment (scope)	Examination of lecture (90 min.)							
ile e	Module examination								
npol	Contribution to final mark	100% examination							
Σ	Retake examination	Examination (90 min.)							
Frequer	ncy	Every semester duration: 1 semester							
Intake c	apacity	Lecture and tutorial: unlimited (capacity of lecture hall)							
Languag	ge of instruction	German							
Additio	nal information	Guidance on module and required literature: see notice board/date: see course catalogue							

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Please note	that only the German version of the mo	dules is official and legally	binding. The E	inglish version is for i	nformative purposes on	ıly.	
Module	e code	Manufacturing T	echnology	1		2 nd sem.	4 CP
Bachelo	or	Professional and	Business	Education			
Module	2	Manufacturing T	echnolog	y			
Faculty	/Subject/Department	University of app	lied scien	ces: Faculty 03	/MMEW		
Associa course/	ted degree 'Semester taken	Bachelor PBE, 2 nd	^d semeste	r			
Module	e coordinator	cf. German versio	on				
Prerequ	uisites	None					
f Learning outcomes	The students are familiar with t technology, are able to assess understand the m fields of application are familiar with t Powder metallurg 	ne production route of sintered parts and with the advantages and disadvantages of this in which cases this technology is to be applied, ost important welding methods and the required relevant information; are aware of the n of these methods and their advantages and disadvantages, he fundamental design of welding systems.					
Contents of module	 Technical metals, casting, forming, joining and separation processes Welding technology, technical description of selected welding methods, fields of application, important information 						
Percentage share of instruction form(s)		Lecture 100%					
	Total workload	120 hours = 4 EC	rs credits	(1 ECTS = 30	hours)		
ad in hours	course type and title	A courses B auto- C examination contact b preparation/ nomous incl. preparation hours revision, work module-component examination					
Vorkle	L Lect. Manufacturing Tech	nnology 60	30	15	15	120	
-							
	Sum	60	30	15	15	120	
io	Prerequisite(s) for examination	Regular and activ	e participa	ation in course	S		
xaminat	Form(s) of assessment (scope)	Examination of le	cture (90	min.)			
lle e	Module examination						
opo	Contribution to final mark	50% examination	1 and 509	% examination	2		
Σ	Retake examination	Examination (90 min.)					
Frequer	псу	Every semester	duration	: 1 semester			
Intake c	apacity	Lecture: unlimite	d (capacit	y of lecture hal	I)		
Languag	ge of instruction	German					
Additior	nal information	Guidance on module and required literature: see notice board/date: see course					

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Please note	that only the German version of the mo	dules is official ar	id legally binding. The E	nglish version is for	informative purposes o	only.		
Module	e code	Measurem	ent Engineering			4 th sem.	6 CP	
Bachelo	or	Professional and Business Education						
Module	2	Measuren	nent Engineering					
Faculty	/Subject/Department	University	of applied sciend	ces: Faculty 03	/MMEW			
Associa course/	ted degree /Semester taken	Bachelor P	BE, 4 th semester					
Module	e coordinator	cf. Germar	n version					
Prerequ	uisites	None						
Learning outcomes	 are familiar with the fundamentals of applying of measurement equipment in an industrial environment are aware possible causes of causes and have the ability to assess these are familiar with the methods for analysing and assessing measured data and are have the ability to apply these to typical data series understand the principal functionality of selected measurement equipment and methods 							
Contents of module	 General fundamentals, measurement principles Measurement errors, causes, analysis and mathematical description Measurement of mechanical values Electrical metrology Selected sensors Processing of measured data Production measurement technology 							
Percentage share of instruction form(s)		Lecture 67%/tutorial 33%						
	Total workload	180 hours	= 6 ECTS credits	(1 ECTS = 30	hours)			
ad in hours	a Course type and title	A cou a contact hours m	rses b preparation/ revision, odule-componer examination	B auto- nomous work nt	C examination incl. prepara	n ation Sum		
Vorklo	L Lecture Metrology	60	30		30	120		
>	LT Laboratory tutorials	30	30			60		
	Sum	90	60		30	180		
tion	Prerequisite(s) for examination	Regular and active participation in courses						
le examinat	Form(s) of assessment (scope) Module examination	Examinatio	n of lecture (90 i	min.)				
Inpo	Contribution to final mark	100% exam	nination					
Š	Retake examination	Examinatio	n (90 min.)					
Frequer	псу	Every seme	ester duration	: 1 semester su	winter semest mmer semester	er: lecture : lecture		
Intake c	apacity	Lecture: ur	limited (capacity	of lecture ha)			
Languag	ge of instruction	German						
Additio	nal information	Guidance on module and required literature: in first lecture						

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Please note	that only the German version of the mod	dules is official and	egally binding. The	English version is for i	informative purposes	only.			
Module	e code	Production a	and Quality As	surance		5 th sem.	5 CP		
Bachelo	or	Professional	Professional and Business Education						
Module	2	Production and Quality Assurance							
Faculty	/Subject/Department	University of	f applied scien	ces: Faculty 03	/MMEW				
Associa	ted degree	Bachelor PB	E, 5 th semeste	r					
course/	'Semester taken								
Module	e coordinator	cf. German v	version						
Prerequ	uisites	Manufacturi	ng Technology	ý					
Learning outcomes	 trends in manufac standards and gui methods of qualit methods of integr 	vith cturing techno delines, ry assurance, rating quality o	ring technology, lines, issurance, ing quality data into the operational flow of information						
Contents of module	 Trends in manufa risks and advice fo standards and gui methods of qualit integration of qua 	cturing techno or users, delines, y assurance, ality data into	uring technology, • users, elines, assurance, ity data into the operational flow of information						
Percent form(s)	tage share of instruction	Lecture 75%/seminar 15%/tutorial 10%							
	Total workload	150 hours = 5	5 ECTS credits	(1 ECTS = 30	hours)				
l in hours	a Course type and title	A courses B auto- C examination contact b preparation/ nomous incl. preparation hours revision, work module-component							
load	L Lecture	45	30	10	15	100			
Vork	T Laboratory tutorials	10	10			20			
5	Si Sominar	15	15			20			
		15				50			
	Sum	70	55	10	15	150			
u	Prerequisite(s) for	1. Reg	ular and active	e participation	in courses	torials			
inati	Form(s) of assessment	Z. Test	of lecture (90	min)					
ami	(scope)	Examination		,					
e e	Module examination								
Inpo	Contribution to final mark	100% examir	nation						
Š	Retake examination	Written exan	nination (90 m	nin.)					
Frequer	псу	Every semest	ter duration	n: 1 semester	summer seme	ester: seminar			
Intake c	apacity	Lecture: unli laboratory tu	mited (capacit itorial and sen	y of lecture ha ninar: 60 stude	ll), nts each				
Languag	ge of instruction	German							
Additio	nal information	Guidance on catalogue	module and r	equired literati	ure: see notice l	board/date: see cou	ırse		

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Please note t	ease note that only the German version of the modules is official and legally binding. The English version is for informative purposes only.								
Module codeControl Engineering5 CF5 CF5 CF						5 CP			
Bachelo	or	Professional and Business Education							
Module		Control Engineering							
Faculty,	/Subject/Department	University of applied sciences: Faculty 03/MMEW							
Associa	ted to degree	Bachelor PBE,	5 th semester						
course/	Semester taken	of Cormon version							
Preregu		Common sens							
Learning outcomes	Methodological fundamentals of control engineering: the lecture covers the most important fundamentals and functional elements of technical systems which contain control systems. The content of the course will be illustrated with the help of numerous examples taken from the area of supply engineering, energy process engineering and environmental process engineering, and from the area of the application of renewable energies. All elements of the lecture will be put into practice in the laboratory sessions, in which students will autonomously use simulation software with system data as input.						ntals and l be cess e energies. itonomously		
Module contents	 Steady state behaviour and time response of control system units Mathematical modelling on the basis of energy and material balances Simulation of system behaviour on the basis of difference equations Adjustment of modelling approaches by comparison of simulation results with system data Fundamental control methods Discontinuous controls (on-off control and multiple discontinuous controls) Simple continuous controls (proportional behaviour, standard controls with PID behaviour) Investigation of the control system behaviour (stability) with frequency characteristic methods Selection of the appropriate controller behaviour and determination of the setting values for the controller Simulation of closed control systems with standardize d system models Overview of digital automation systems Laboratory: All elements of the lecture will be put into practice through the use of a teaching software that will be 								
Percent form(s)	age share of instruction	1 seminar 60%/laboratory 40%							
	Total workload	150 hours = 5	ECTS credits						
n hours	a Course type and title	A courses contact b p hours modu exa	s reparation/ revision, ile-componer amination	B auto- nomous work nt	C examinatio incl. prepa	n ration Sum			
i pad i	Se Seminar CE	45				45			
orkle	L Laboratory 15	15			30				
Ň	FD Final design assignme	nt	10	55		65			
	Sum	60	25	55		140			
ition	Prerequisite(s) for examination	Regular and ac	ctive participa	ation in course	S				
lule examinat	Form(s) of assessment (scope) module-component	1. Se: written o 2. L: 3 laborato 3. FD: Final des	or oral exami ory reports sign assignme	nation of all co	ontent covered	in module			
Mo	Contribution to final mark	80% examinati	ion or technic	cal discussion,	20% reports				

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lease note that only the German version of the modules is official and legally binding. The English version is for informative purposes only.						

	Retake examination	Every module-component examination must be passed. Individual module-component examinations can be retaken.				
Frequency		Every semester duration: 1 semester Se: lecture in seminar form L: laboratory				
Intake capacity		Lecture: unlimited (capacity of lecture hall), laboratory and seminar: 70 students each				
Language of instruction		German				
Additional information		Guidance on module and required literature: see notice board/date: see course catalogue				

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Please note	lease note that only the German version of the modules is official and legally binding. The English version is for informative purposes only.					
Module	e code	Sensor and Actuator En	gineering	5 th sem.	5 CP	
Bachelo	or	Professional and Busine	ss Education			
Module		Sensor and Actuator En	gineering			
Faculty	/Subject/Department	University of applied sci	ences: Faculty 03/MMEW			
Associa	ted degree	Bachelor PBE, 5 th semes	ter			
course/	Semester taken	-				
Module	e coordinator	cf. German version				
Prerequ	uisites	Fundamental modules,	Metrology			
Learning outcomes	 sensor technologi fundamentals and actuators, magne nanotechnology 	ensor technologies, operating principles and characteristics undamentals and technological principles of motors/actuators, small motors, piezo actuators, magnetic actuators, magnetoelastic actuators, micro motors, memory metals, thermal propulsion systems, nanotechnology				
Module contents	 Operating princip pressure, force, fi Motors/actuators actuators, magne nanotechnology 	es for determining rotational speed, distance, velocity, acceleration, vibration, torque, Il level, flow rate , fundamentals/technological principles, small motors, piezo actuators, magnetic toelastic actuators, micro motors, memory metals, thermal propulsion systems,				
Percent form(s)	tage share of instruction	Lecture 75%/tutorial 25%				
	Total workload	150 hours = 5 ECTS cred	ts (1 ECTS = 30 hours)			
ad in hours	course type and title	A courses contact b preparation hours revision, module-compo examination	B auto- C examinat n/ nomous incl. preg work nent	ion paration Sum		
/orklo	L Lecture	45 30	30	105		
5	LT Laboratory tutorials	15 15	15	45		
	Sum	60 45	15 30	150		
-	Prerequisite(s) for	1. Regular and act	ive participation in courses			
atior	examination	2. Tests on three	experiments in the laboratory	tutorials		
xamina	Form(s) of assessment (scope)	Examination of lecture (90 min.)			
ile e	Module examination					
lodu	Contribution to final mark	100% examination				
2	Retake examination	Written examination (90	min.)			
Frequer	псу	Every semester durat	ion: 1 semester summer se	mester: seminar		
Intake c	apacity	Lecture: unlimited (capa each	city of lecture hall), laboratory	y tutorial and seminar:	60 students	
Languag	ge of instruction	German				
Addition	nal information	Guidance module and required literature: see notice board/date: see course catalogue				

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 Please note that only the German version of the modules is official and legally binding. The English version is for informative purposes only.
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5th/6th sem. Module code 5 CP Machine Tools **Bachelor Professional and Business Education** Machine Tools, 3Se/1P Module MMEW Faculty/Subject/Department Bachelor PBE, 5th/6th semester Associated degree course/Semester taken Module coordinator cf. German version Prerequisites None The students Learning outcomes have the ability to describe, name and classify machine tools • are aware of the fundaments demands on machine tools can select and dimension machine tools are familiar with the fundamental components of machine tools and can select and dimension these Types and designs of machine tools for selected manufacturing processes, e.g. cutting and forming • contents Module Selected machine tool components, e.g. drives, guideways, spindles, beds, control systems, ... Characteristics of machine tools from a static, dynamic and thermal point of view Selected methods for assessing machine tools, e.g. modal analysis, geometrical loss, ... Current trends in machine tools ٠ Percentage share of instruction Seminar 75%/laboratory 25% form(s) Total workload 150 hours = 5 ECTS credits (1 ECTS = 30 hours) A courses B auto-C examination Workload in hours a contact b preparation/ nomous incl. preparation Type and title of course hours revision, work module-component examination Sum 30 Laboratory 45 L 15 30 45 30 105 Seminar Se 60 60 30 150 Sum Prerequisite(s) for Regular and active participation in courses examination Form(s) of assessment 1. Examination of seminar and laboratory (90 min.) (scope) 2. 3 laboratory reports Module examination module-component Contribution to final mark 90% examination, 10% laboratory reports If a module-component examination is not passed, a retake examination will take place (90 min.). The total of 5 points (mark of 4.0) must be achieved in order to pass the examination. If the student does not pass the laboratory reports section of the assessment, the reports can be revised within three weeks. If more than one part of the modulecomponent examination is not passed, the module-component retake examination consists of the participation in the retake test (90 min.) **Retake examination** Retake of examination (90 min.) and re-submission of laboratory reports Frequency Every year duration: 1 semester Intake capacity Seminar and laboratory: 60 students each Language of instruction German Guidance on module and required literature: see notice board/date: see course Additional information catalogue

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Please note	that only the German version of the mo	dules is official and legally binding. The English version is for informative purpos	es only.			
Module	e code	Vibration Technology	5 th /6 th sem.	5 CP		
Bachelo	or	Professional and Business Education				
Module	2	Vibration Technology				
Faculty	/Subject/Department	University of applied sciences: Faculty 03/MMEW				
Associa course/	ted degree 'Semester taken	Bachelor PBE, 5 th /6 th semester				
Module	coordinator	cf. German version				
Prerequ	uisites	None				
Learning outcomes	 The students are familiar with the fundamental laws for analysing oscillating systems and have the ability to apply these, are familiar with oscillation and wave propagation in a continuum, are aware of the fundamental methods of experimental and numerical vibration analysis and have the ability to apply these understand the principal analysis methods of mechanical constructions with regards to vibration and acoustics 					
Module contents	 Single-mass oscillator, damping, harmonic excitation General periodic excitation, impact excitation, Fourier analysis Continuous oscillators Experimental vibration analysis, numerical methods Technical acoustics 					
Percent form(s)	tage share of instruction	Lecture 67%/tutorial 33%				
	Total workload	150 hours = 5 ECTS credits				
d in hours	a co Course type and title	A courses B auto- C examination ontact b preparation/ nomous incl. preparation hours revision, work module-component examination Su	m			
doad	L Vibration Technology	60 30 20	110			
Vorl	T Calculation tutorial	30 10	40			
-	Sum	90 40 20 15	0			
tion	Prerequisite(s) for examination	Regular and active participation in courses				
xaminat	Form(s) of assessment (scope)	1. L: examination of lecture (90 min.)				
rle e	Module examination					
lodı	Contribution to final mark	100% examination				
2	Retake examination	Examination (90 min.)				
Frequer	псу	Every semester duration: 1 semester				
Intake c	apacity	Lecture and tutorial: unlimited (capacity of lecture hall)			
Languag	ge of instruction	German				
Additior	nal information	Guidance on module and required literature:: see notice board/date: see course catalogue				

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Module code		Mining and Extraction 5 th sem. 5		5 CP				
Bachelor Professional and Business Education								
Module	2	Mining and	Mining and Extraction					
Faculty	/Subject/Department	University o	f applied sciences: Fac	culty 03/MMEW				
Associa course/	ted degree /Semester taken	Bachelor PB	E, 5 th semester					
Module	e coordinator	cf. German	version					
Prereau	uisites	None						
	The students							
es es	 have a fundament 	tal knowledge	e of materials handling	technology,				
nin om	are familiar with o	continuous an	d discontinuous conve	eyors,				
Lear	have the ability to	o analytically o	determine conveyor ca	apabilities,				
- 0	 have the ability to 	o constructive	ly assess material han	dling plants.				
	Classification of co	onvevors						
	Determination of	the conveyor	capability					
	Calculation of the	e load torque						
ontents	Rope drives							
	Chain drives							
	Running wheels a	ind rails						
	Brakes Load bandling devise							
	Load nanding device Link conveyors							
e	Belt conveyors							
npc	Circular conveyors							
Ĕ	Bucket conveyors							
	Gravity conveyors							
	Powered roller conveyors							
	Screw conveyors							
	Oscillating conveyors							
	 Pneumatic conveyors System reliability 							
Percent	tage share of instruction							
form(s)	tage share of instruction	Lecture 50%	6/tutorial 50%					
. ,	Total workload	150 hours - 5 ECTS credits (1 ECTS - 20 hours)						
		A cours	es B auto	- C examinati	on			
nrs	ā	a contact b	preparation/ nor	nous incl. prepa	aration			
ho	Course type and title	hours	revision, work					
d in		mo	dule-component		c			
kloa		6	examination		Sum			
Vor	L Materials-handling Techr	nology 45	15	15	75			
>	T Calculation tutorial	45	30		75			
	Sum	90	45	15	150			
Ę	Prerequisite(s) for examination	Regular and	active participation in	courses				
ule atio	Form(s) of assessment	Examination	of lecture (90 min.)					
1od min	(scope)							
exal	Module examination							
	Contribution to final mark	100% examination						

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lease note that only the German version of the modules is official and legally binding. The English version is for informative purposes only.				

	Retake examination	Examination (90 min.)	
Frequer	псу	Every semester duration: 1 semester	
Intake capacity		Lecture: unlimited (capacity of lecture hall)	
Language of instruction		German	
Additio	nal information	Guidance on module and required literature: see notice board/date: see course catalogue	

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Please note that only the German version of the modules is official and legally binding. The English version is for informative purposes only.				

Module	e code	Microsystems Engineering 5 th sem. 5 CP					
Bachelo	or	Professional and Business Education					
Module	2	Microsystems Engineering					
Faculty	/Subject/Department	University of applied sciences: F	aculty 03/MMEW				
Associa course/	ited degree /Semester taken	Bachelor PBE, 5 th semester					
Module	e coordinator	cf. German version					
Prerequ	uisites	None					
Learning outcomes	The students are familiar v the fundamentals microstructures a the materials of n micro-technical co lithographic meth	vith of miniaturization, nd their manufacture, nicrotechnology, omponents, ods					
Module contents	 Microstructures a materials of micro micro-technical co lithographic meth 	s and their manufacture, crotechnology, l components, ethods					
Percent form(s)	tage share of instruction	Seminar 100%					
	Total workload	150 hours = 5 ECTS credits (1 E	CTS = 30 hours)				
oad in hours	course type and title	A courses B at a contact b preparation/ n hours revision, wo module-component examination	ito- C examination omous incl. prepark	on aration Sum			
/orkl	Si Seminar	60 60 1	.5 15	150			
5							
	Sum	60 60 1	5 15	150			
tion	Prerequisite(s) for examination	Regular and active participation	in courses				
e examinat	Form(s) of assessment (scope) Module examination	Examination of seminar (90 min.)				
dule	Contribution to final mark	100% examination					
ъ	Retake examination	Examination (90 min.)					
Frequer	і псу	Every semester duration: 1 se	mester summer sen	nester: seminar			
Intake capacity		Lecture: unlimited (capacity of lecture hall), laboratory tutorial and seminar: 60 students each					
Languag	ge of instruction	German					
Additio	nal information	Guidance on module and required literature: see notice board/date: see course catalogue					

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Please note	that only the German version of the mod	dules is official and legally binding. The English version is for informative purposes	s only.			
Module code		Technical Optics	5 th sem.	5 CP		
Bachelo	or	Professional and Business Education				
Module		Technical Optics				
Faculty,	/Subject/Department	University of applied sciences: Faculty 03/MMEW				
Associa	ted degree	Bachelor PBE, 5 th semester				
course/	Semester taken					
Module	coordinator	cf. German version				
Prerequ	uisites	None				
Learning outcomes	The students understand the fu are familiar with t understand the praphications are familiar with t 	indamentals of light and comprehend the principle of the he laws of geometrical optics and the fundamentals of ca rinciple of interference and the principle of interferometr the fundamental mathematical and graphical solutions of	e formation of light alculating optical com ry and their most imp optical systems	ponents ortant		
Module contents	 Definition of light Geometrical optic Physical optics, in Optical systems 	(of optical radiation), formation of light, light propagation s, optical components terferometry				
Percentage share of instruction form(s)		Lecture 75%/tutorial 25%				
	Total workload	150 hours = 5 ECTS credits (1 ECTS = 30 hours)				
oad in hours	a Course type and title	A courses B auto- C examination contact b preparation/ nomous incl. preparation/ nomous incl. preparation/ hours revision, work module-component examination	on ration Sum			
orkle	L Lecture Technical Optics	s 45 30 30	105			
Ň	T Tutorials	15 30	45			
	Sum	60 60 30	150			
amination	Prerequisite(s) for examination Form(s) of assessment (scope)	Regular and active participation in courses Examination of lecture (90 min.)				
s ex	Module examination					
dule	Contribution to final mark	100% examination				
Мо	Retake examination	Examination (90 min.)				
Frequer	СУ	Every semester duration: 1 semester				
Intake c	apacity	Lecture: unlimited (capacity of lecture hall)				
Languag	ge of instruction	German				
Additior	nal information	Guidance on module and required literature: see notice board/date: see course catalogue				

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Module	e code	Electrical Drives		5 th sem.	5 CP	
Bachelo)r	Professional and Bu	usiness Education			
Module	2	Electrical Drives				
Faculty	/Subject/Department	University of applie	ed sciences: Faculty 03	/MMEW		
Associa	ted degree	Bachelor PBE, 5 th se	emester			
course/	Semester taken	-				
Module	e coordinator	cf. German version				
Prerequ	Jisites	None				
Learning outcomes	 have a fundament comprehend the a are familiar with t 	ental knowledge of electrical drive technology, le application of electrical machines, h various drive concepts, h the optimal use of motors.				
Module contents	 electromagnetism construction, ope DC motors, three-phase AC m non-standard and use of electrical d 	, ration, characteristic curves and types of loading of electrical machines otors, small motors, rives with converters.				
Percent form(s)	age share of instruction	Lecture 50%/tutorial 50%				
hours	Total workload	150 hours = 5 ECTS	credits (1 ECTS = 30	hours)		
	a Course type and title	A courses a contact b prepar hours revis module-co	B auto- ration/ nomous ion, work mponent	C examination incl. prepa	on aration	
oad i	Lacture Electrical Drives	> 20 20		20	100	
orkle		30 20		20	100	
Ň		30 2	0		50	
	-					
	Sum	60 40	30	20	150	
ion	Prerequisite(s) for examination	Regular and active	participation in course	!S		
aminat	Form(s) of assessment (scope)	Examination of lecture (60 min.)				
e ex	Module examination					
npo	Contribution to final mark	100% examination				
Σ	Retake examination	Examination (60 mi	n.)			
Frequer	псу	Every semester o	luration: 1 semester	winter seme	ster: lecture and	
				laborato	ory tutorial	
			su	mmer semest	er: seminar	
Intake c	apacity	Lecture: unlimited (capacity of lecture ha	ll)		
Languag	ge of instruction	German			the second second	
Additior	nal information	Guidance on module and required literature: lecture notes as well as Fischer, <i>Elektrische Maschinen</i> , Hanser-Verlag 2005				

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Please note	that only the German version of the mo	dules is official and legally binding. The English version is for informative purp	oses only.		
Module	e code	Automotive Engineering	5 th sem.	5 CP	
Bachelor		Professional and Business Education			
Module	2	Automotive Engineering			
Faculty	/Subject/Department	University of applied sciences: Faculty 03/MMEW			
Associa	ited degree	Bachelor PBE, 5 th semester			
course/	/Semester taken				
Module	e coordinator	cf. German version			
Prerequ	uisites	Knowledge of statics and dynamics			
Learning outcomes	The students are familiar with t can determine tyr can calculate brak are familiar with t are familiar with a	 are familiar with the calculation of driving resistance can determine tyre forces in dependence of wheelspin, skew and wheel load can calculate brake power are familiar with the concepts of steering are familiar with automotive data bus systems 			
Module contents	 Wheels and tyres Driving resistances Brakes Steering Wheel suspensions Automobile electronics and bus systems 				
Percent form(s)	tage share of instruction	Lecture 75%/laboratory tutorial 25%			
	Total workload	150 hours = 5 ECTS credits (1 ECTS = 30 hours)			
d in hours	a Type and title of course	A courses B auto- C examina contact b preparation/ nomous incl. pre hours revision, work module-component examination	tion paration Sum		
orklo	L Lecture Auto. Eng.	45 30 45	120		
3	LT Laboratory tutorials	15 15	30		
	Sum	60 45 45	150		
c	Prerequisite(s) for	1. Regular and active participation in courses			
atio	examination	2. Tests on three experiments in the laboratory	v tutorials		
xamina	Form(s) of assessment (scope)	Examination of lecture (90 min.)			
lle e	Module examination				
lodı	Contribution to final mark	100% examination			
2	Retake examination	Examination (90 min.)			
Frequency Every semester duration: 1 semester winter semester: lecture + lab tut		ster: lecture + lab tutorial	al		
Intake capacity Lec		Lecture: unlimited (capacity of lecture hall), laborator	y tutorial and seminar:	4 students	
Language of instruction		German			
Additional information		Guidance on module and required literature: see notice board/date: see course catalogue			

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Please note	that only the German version of the mo	lules is official and legally	binding. The English version is for	informative purpose	s only.	
Module	e code	Automotive Driv	es		5 th sem.	5 CP
Bachelor		Professional and Business Education				
Module	2	Automotive Driv	res			
Faculty	/Subject/Department	University of app	lied sciences: Faculty 03	/MMEW		
Associa	ted degree	Bachelor PBE, 5 th	semester			
course/	'Semester taken					
Module	e coordinator	cf. German versi	on			
Prerequ	uisites	Knowledge of sta	atics and dynamics			
Learning outcomes	The students can calculate vehi can assess the pri can calculate the are familiar with t 	le consumption, nary energy demand of various drive concepts, riving performance, notor dimensioning, motor installation and vibration insulation, ne designing of gears and drives.				
Module contents	 World energy resources Energy demand and energy conversion Piston engines Gears and converters Electric motors and hybrid drives 					
Percent form(s)	tage share of instruction	Lecture 75%/laboratory tutorial 25%				
	Total workload	150 hours = 5 EC	TS credits (1 ECTS = 30	hours)		
d in hours	a Type and title of course	A courses contact b prep hours re module- exam	B auto- paration/ nomous vision, work component ination	C examination incl. prepa	on aration Sum	
/orklo	L Lecture Auto. Drives	45	30	45	120	
5	LT Laboratory tutorials	15	15		30	
	Sum	60 4	5	45	150	
c	Prerequisite(s) for	1. Regular	and active participation	in courses		
atio	examination	2. Tests on	three experiments in th	e laboratory t	utorials	
xamina	Form(s) of assessment (scope)	Examination of le	ecture (90 min.)			
lle e	Module examination					
npo	Contribution to final mark	100% examinatio	n			
Σ	Retake examination	Examination (90	min.)			
Frequency Every semester duration: 1 semester winter semester: lecture + lab t		ster: lecture + lab tu cture + lab tutorial	ıtorial			
Intake capacity Lecture: each		Lecture: unlimite each	d (capacity of lecture ha	ll), laboratory	tutorial and seminar	r: 4 students
Languag	ge of instruction	German			<u></u>	
Additional information Guidance on module and required literature: see notice board/date: see cour catalogue		urse				

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Please note	that only the German version of the mo	dules is official and legally binding. The English version is for informative purposes	only.		
Module code		Piston Machines	5 th sem.	5 CP	
Bachelor		Professional and Business Education			
Module	2	Piston Machines			
Faculty	/Subject/Department	University of applied sciences: Faculty 03/MMEW			
Associa	ted degree	Bachelor PBE, 5 th semester			
course/	/Semester taken				
Module	e coordinator	cf. German version			
Prerequ	uisites	Knowledge of thermodynamics			
Learning outcomes	 can assess differe can calculate ther can calculate iner can calibrate com 	ferent construction types for various cases of application thermodynamic cycles inertia forces and mass balance combustion engines			
Module contents	 Classification and construction types of reciprocating engines Thermodynamic fundamentals Parameters and characteristic diagrams of combustion engines Kinematics and mass balance of reciprocating engines Mixture preparation and charge exchange of combustion engines Machine elements of combustion engines 				
Percent form(s)	tage share of instruction	Lecture 75%/laboratory tutorial 25%			
	Total workload	150 hours = 5 ECTS credits (1 ECTS = 30 hours)			
d in hours	a Course type and title	A courses B auto- C examination a contact b preparation/ nomous incl. prepa hours revision, work module-component examination	n ration Sum		
Vorklo	L Lecture Rec. Engines	45 30 45	120		
>	LT Laboratory tutorials	15 15	30		
	Sum	60 45 45	150		
ation	Prerequisite(s) for examination	 Regular and active participation in courses Test on three experiments in the laboratory tut 	orials		
examin	Form(s) of assessment (scope)	Examination of lecture (90 min.)			
ule	Module examination				
lod	Contribution to final mark	100% examination			
~	Retake examination	Written examination (90 min.)			
Frequer	Frequency Every semester duration: 1 semester winter semester: lecture + lab tutoria summer semester: lecture + lab tutorial		orial		
Intake capacity		Lecture: unlimited (capacity of lecture hall), laboratory tutorial and seminar: 4 students			
Language of instruction German					
Additio	nal information	Guidance on module and literature: see notice board/da	ate: see course catalo	prije	