Appendix C: Module catalogue

for the study programme Biotechnology and Instrumentation Engineering B.Sc.

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^{*}Translations of these module descriptions are currently not available.

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129	1	360 h	12	6th sem	or ester	7th	each ser	nester	12 we	eks
1	Course:		Planned group	sizes	Scop	e	Actual of time / classroot teaching	om	Self-stu	idy
	Lecture		60 students		0	weekly hours	0	h	360	h
	Seminar	lessons	30 students		0	weekly hours	0	h	0	h
	Exercise		20 students		0	weekly hours	0	h	0	h
		or seminar	15 students		0	weekly hours		h	0	h
	·	ed self-study outcomes/co	60 students		0	weekly hours	0	h	0	h
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102		150 h	5	2nd sem	or ester			(Summer)	1 sem	ester
1	Course:	1	Planned group	sizes	Scop	ре		contact classroom	Self-stu	dy
	Lecture		60 students		3	weekly hours	45	h	67.5	h
	Seminar	lessons	30 students		1	weekly hours	15	h	22.5	h
	Exercise		20 students		0	weekly hours	0	h	0	h
		or seminar	15 students		0	weekly hours	0	h	0	h
	Supervis	ed self-study	60 students		0	weekly hours	0	h	0	h
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1029	9	150 h	5	5th:	semest	ter	Annual (Winter)	1 sem	ester
1	Course:	l	Planned group	sizes	Scop	е	Actual of time / contents	lassroom	Self-stud	dy
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar	lessons	30 students		1	weekly hours	15	h	22.5	h
	Exercise		20 students		0	weekly hours	0	h	0	h
	Practical	or seminar	15 students		1	weekly hours	15	h	22.5	h
	Supervis	ed self-study	60 students		0	weekly hours	0	h	0	h
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106		150 h	5	2nd	semes	ter	Annual (S	Summer)	1 seme	ester
1	Course:		Planned group	sizes	Scop	e	Actual co		Self-stuc	ly
	Lecture		60 students		2	weekly hours		h	45	h
	Seminar	lessons	30 students		1	weekly hours	15	h	22.5	h
	Exercise		20 students		0	weekly hours	0	h	0	h
	Practical	or seminar	15 students		1	weekly hours	15	h	22.5	h
	Supervise	ed self-study	60 students		0	weekly hours	0	h	0	h
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107	'3	150 h	5	1st s	emeste	er	Annual (Winter)		1 sem	ester
1	Course:		Planned group	sizes	Scop	е	Actual of time / cl	assroom	Self-stud	dy
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar	lessons	30 students		1	weekly hours	15	h	22.5	h
	Exercise		20 students		0	weekly hours	0	h	0	h
	Practical	or seminar	15 students		1	weekly hours	15	h	22.5	h
	Supervis	ed self-study	60 students		0	weekly hours	0	h	0	h
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			cess Factors fo			otor.	Fragues	ov of the	GUD	
num	tification ber:	Workload:	Credits:	Siud	ly semes	ster:	offer	cy of the	Durati	on:
313		150 h	5	5th	semes	ter	Annual	(Winter)	1 sem	ester
1	Course:	1	Planned group	sizes	Scop	e	Actual time / classro teaching		Self-stu	idy
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar	lessons	30 students		2	weekly hours	30	h	45	h
	Exercise		20 students		0	weekly hours	0	h	0	h
	Practical	or seminar	15 students		0	weekly hours	0	h	0	h
	Supervis	ed self-study	60 students		0	weekly hours	0	h	0	h
3	kk C a irr tt a g p a n irr Contents C C C	pirective, Genere sensitised and ependently and ependently are able to independent and professional prefamiliar with an agement and apportunities (legal bases are able to independent and apportunities (legal bases are apportunities (legal bases are able approfessione	nciples in the co eral Equal Treat to human heter recognise ster nvironment. ependently coll treaming and di	tment A rogene reotypin lect reliversity pries an this, a ersity n gende anager ences abbre attitude ag diver pusines	Act) ity in the organd of an anage of an a	e corporcan development in a constant in a c	rate con elop ide on on es in the culop conce a corporation in the stics (e.g. roduct of diversity	text. tablished of seess their context context of gender addevelopment of the sees their context of the contex	sible cha concepts relevance ourse on o eas for the ext. oroaches tive). Ger of diversition age) i ent, huma	ngesir sucha e for diversi e to equ neral
4		f teaching: e, seminar less	sons, presentati	ion, gro	oup wor	k, prese	ntation (of seminar	paper	
5	Participa	tion requireme	nts:							
S	Formal:	LIOIT TEQUITETTIE	11101							
	Content:	None	e							
3	Forms of	f assessment:								
,	_				4					
7			examination or our		aminati	on				

8	Application of the module (in the following study programmes)
	Applied Mathematics B.Sc., Biotechnology and Instrumentation Engineering B.Sc., Electrical
	Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechanical Engineering B.Eng.,
	Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management
	B.Sc.
9	Importance of the grade for the final grade:
	according to BRPO
10	Module coordinator:
	Prof. DrIng. Andrea Kaimann
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

			erative Prograr	111111119					IN1	
num	tification ber:	Workload:	Credits:	Study	y semes		Frequence offer	cy of the	Duratio	n:
1106		150 h	5	1st s	emeste		Annual	(Winter)	1 seme	ester
1	Course:	1	Planned group	sizes	Scop	е		contact :lassroom g	Self-stuc	dy
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar	lessons	30 students		1	weekly hours	15	h	22.5	h
	Exercise	ı	20 students		0	weekly hours	0	h	0	h
	Practical	or seminar	15 students		1	weekly hours	15	h	22.5	h
	Supervis	ed self-study	60 students		0	weekly hours	0	h	0	h
2	_	outcomes/con	<u>l</u> npetences: e to present alg	حالا إس	in ele :-		, af #la - ·			
3	types. Contents Teachir - F - 7 - 7 - 1	s: ng content: Formal basics Furing machir Algorithms an The programr Basic data typ	of computer so ne, decidability, d representation ning language (pes, composite d instruction	cience (von Ne on of alg C and it	set the umanr orithm	ory, Boc archite s lard libra	olean alg cture) aries		·	
	- F	Functions, sco Efficiency of a	ures of imperat opes and recurs Igorithms	' '	gramm	ing(bloc	cks, loop:	s, conditio	nal staten	nent)
4		f teaching: e, seminar less	sons with exerc	ises, pr	actical	course				
5	Formal: Content:		Э							
6	Written		combination earl		tion, pe	erforman	ce exam	nination or	oral exam	ninatio
7			pass and cours	se asse:						
			ule (in the followin	a Sinin						
8	Applicati Biotech	on of the modu nnology and Ir	nstrumentation	Engine	-		Mechat	ronicsB.S	C.	
	Applicati Biotech Importar accord	on of the modu nnology and Ir		Engine	-		Mechat	ronicsB.S	C.	

		ience 2 – Ok	Dject-Onented i			_			IN2	
	ntification	Workload:	Credits:	Stuc	dy semes	ster:	Frequenc	cy of the	Duratio	on:
	nber:		_				offer	(0		
1110)	150 h	5	2nd	l semes	ster	Annuai	(Summer)	1 sem	ester
1	Course:		Planned group	cizoc	Scop	<u> </u>	Actual	contact	Self-stud	dv
'	Course.		Tiariried group	31203	3000		time / c	classroom	Jen-stat	ч
							teachin	g		
	Lecture		60 students		2	weekly	30	h	45	h
	C =		00 1 1 1		+	hours	45	+ .	00.5	-
	Seminar	lessons	30 students		1	weekly hours	15	h	22.5	h
	Exercise		20 students		0	weekly	0	h	0	h
	LACICISC		20 students			hours		"	O	''
	Practical	or seminar	15 students		1	weekly	15	h	22.5	h
						hours				
	Supervis	ed self-study	60 students		0	weekly	0	h	0	h
						hours				
2	Learning	outcomes/co	mpetences:							
	The stu	dents are abl	le to analyse, ab	stract a	and mod	deltasks	in the fie	eld of digita	ldata pr	ocessir
			nd test them pro					_		
		•	able to apply th	-	-		-			
	-				-	-			_	
			tudents are able		-				-	_
	_	•	grammingparad	-		-	_		-	
		-	algorithms an					•		
	develop	oment and w	ill be in a positi	on to a	issess t	he effic	iency of	the progra	ammes th	ney ha
	develop	oed.								
3	Contents	3 :								
O		ng content:								
		-	t 100							
		Abstract data								
		•	object-oriented	lprogra	amming	g(abstra	ction, da	ta encapsı	ılation,	
	þ	olymorphisr	n, inheritance)							
	- N	/lodelling lan	iguage UML							
		_	l test-driven SW	/ devel	onment	+				
			tion to SW engi				n nattorn	o architac	turoc)	
			•	•	g(lalon	is, desigi	трацеп	is, architec	lures)	
			nd data structur	es						
4		teaching:								
			sons with exerc	ises, pi	ractical	course				
5		tion requireme								
	Formal:	Non		_						
	Content:		nputer Science	1						
6		assessment:			41.					
			, combination ex		ition, pe	ertorman	ce exan	nination or o	oral exan	nınatio
7			ard of credit point							
			pass and cours							
8			ule (in the followin	-			NA - 1- 1			
			nstrumentation		ering B	.sc.and	iviecnat	ronicsB.Sc	j.	
9	-	-	e for the final grad	ue:						
10		ing to BRPO								
10		coordinator:	tin Hüloo							
	Other inf	. rer. nat. Mar	unnuise							
4.4										
11				00000	0000 - 1	tha b = -	innin	f + h o o o · · · · -	_	
11	Literatu	ire and other	sources will be	annoui	nced at	the beg	jinning of	the course	Э.	
11 12		ire and other	sources will be	annoui	nced at	the beg	jinning of	the course	Э.	

Lecture 60 students 2 weekly 30 h 45 h hours Seminar lessons 30 students 2 weekly 30 h 45 h hours Exercise 20 students 0 weekly 10 h 0 h Fractical or seminar 15 students 0 weekly 0 h 0 h 0 h 10 h 10 h 10 h 10 h 10 h 1	inte	grated Pro	oduct Develo	pment	_					IP	
Course:			Workload:	Credits:	Study	y semes		-	y of the	Duratio	on:
Lecture 60 students 2 weekly 30 h 45 h 5 must be such as a summary of the summary	123	2	150 h	5			6th	Annual (Summer)	1 sem	ester
Seminar lessons 30 students 2 weekly 30 h 45 h hours Exercise 20 students 0 weekly 0 h 0 h 0 h Practical or seminar 15 students 0 weekly 0 h 0 h 0 h 0 h Nours Supervised self-study 60 students 0 weekly 0 h 0 h 0 h 0 h Nours Learning outcomes/competences: The students distinguish between different product development processes and know difference development methods and tools. They can select and apply these methods in a target manner. They are able to solve a technical problem in a methodical, systematic, goal-orier way and apply guiding rules for methodical development. Contents: Methodical development of products (based on VDI 2206, 2221, 2222, among others) Planning, tasks, specifications/requirements list, development structuring -> Overall functions, functional structure, Idea generation/creativity process -> Method overview, discursive and intuitive methor evaluation of alternative solutions, evaluation procedures. Selected development guidel (e.g. cost-conscious development, design in accordance with stresses) 4 Forms of teaching: Lecture, seminar lessons, practical exercises Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.I. Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. DrIng. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.	1	Course:		Planned group s	sizes	Scop	е	time / c	assroom	Self-stud	dy
Exercise 20 students 0 weekly 0 h 0 h 0 h Practical or seminar 15 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 weekly 0 h 0 h 0 h Supervised self-study 60 students 0 hours 1 h Supervised self-study 60 students 0 h 0 h 0 h Supervised self-study 60 students 0 h 0 h 0 h Supervised self-study 60 students 0 h 0 h 0 h Supervised self-study 60 students 0 h 0 h 0 h Supervised self-study 60 students 0 h 0 h 0 h Supervised self-study 60 students 0 h 0 h 0 h Supervised self-study 60 students 0 h 0 h 0 h Supervised self-study 60 students 0 h 0 h 0 h Supervised self-study 60 students 0 h 0 h Supervised self-study 60 students 0 h 0 h 0 h Supervised self-study 60 students 0 h 0 h Supervised self-study 60 h 0 h Supervised self-study 60 students 0 h 0 h Supervised self-study 60 h 0 h 0 h Supervised self-study 60 students 0 h 0 h Supervised self-study 60 students 0 h 0 h Supervised self-study 60 students 0 h 0 h Supervised self-study		Lecture		60 students		2	_	30	h	45	h
Practical or seminar 15 students 0 weekly 0 hours Supervised self-study 60 students 0 weekly 0 hours Learning outcomes/competences: The students distinguish between different product development processes and know different product development methods and tools. They can select and apply these methods in a targer manner. They are able to solve a technical problem in a methodical, systematic, goal-orier way and apply guiding rules for methodical development. Contents: Methodical development of products (based on VDI 2206, 2221, 2222, among others) Planning, tasks, specifications/requirements list, development structuring -> Overall function sub-functions, functional structure, Idea generation/creativity process -> Method overview, discursive and intuitive methor evaluation of alternative solutions, evaluation procedures. Selected development guidel (e.g. cost-conscious development, design in accordance with stresses) Forms of teaching: Lecture, seminar lessons, practical exercises Participation requirements: Formal: None Content: None Content: None Forms of assessment: Written examination, combination examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.I. Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. DrIng. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.		Seminar	lessons	30 students		2		30	h	45	h
Supervised self-study 60 students 0 weekly 0 hours Learning outcomes/competences: The students distinguish between different product development processes and know differ development methods and tools. They can select and apply these methods in a targe manner. They are able to solve a technical problem in a methodical, systematic, goal-orier way and apply guiding rules for methodical development. Contents: Methodical development of products (based on VDI 2206, 2221, 2222, among others) Planning, tasks, specifications/requirements list, development structuring -> Overall functic sub-functions, functional structure, Idea generation/creativity process -> Method overview, discursive and intuitive methe evaluation of alternative solutions, evaluation procedures. Selected development guidel (e.g. cost-conscious development, design in accordance with stresses) Forms of teaching: Lecture, seminar lessons, practical exercises Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.I Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. Dring. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.		Exercise		20 students		0	,	0	h	0	h
Learning outcomes/competences: The students distinguish between different product development processes and know differ development methods and tools. They can select and apply these methods in a targer manner. They are able to solve a technical problem in a methodical, systematic, goal-orier way and apply guiding rules for methodical development. Contents: Methodical development of products (based on VDI 2206, 2221, 2222, among others) Planning, tasks, specifications/requirements list, development structuring -> Overall functions, functional structure, Idea generation/creativity process -> Method overview, discursive and intuitive mether evaluation of alternative solutions, evaluation procedures. Selected development guidel (e.g. cost-conscious development, design in accordance with stresses) Forms of teaching: Lecture, seminar lessons, practical exercises Participation requirements: Formal: None Forms of assessment: Written examination, combination examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.E. Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. DrIng. Klaus Dürkopp Module coordinator: Literature will be announced at the beginning of the course.		Practical	or seminar	15 students		0	,	0	h	0	h
The students distinguish between different product development processes and know differed evelopment methods and tools. They can select and apply these methods in a target manner. They are able to solve a technical problem in a methodical, systematic, goal-orier way and apply guiding rules for methodical development. Contents: Methodical development of products (based on VDI 2206, 2221, 2222, among others) Planning, tasks, specifications/requirements list, development structuring -> Overall functions sub-functions, functional structure, Idea generation/creativity process -> Method overview, discursive and intuitive mether evaluation of alternative solutions, evaluation procedures. Selected development guidel (e.g. cost-conscious development, design in accordance with stresses) Forms of teaching: Lecture, seminar lessons, practical exercises Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.f. Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. DrIng. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.		Supervise	ed self-study	60 students		0		0	h	0	h
Planning, tasks, specifications/requirements list, development structuring -> Overall function sub-functions, functional structure, Idea generation/creativity process -> Method overview, discursive and intuitive mether evaluation of alternative solutions, evaluation procedures. Selected development guidel (e.g. cost-conscious development, design in accordance with stresses) 4 Forms of teaching: Lecture, seminar lessons, practical exercises 5 Participation requirements: Formal: None Content: None 6 Forms of assessment: Written examination, combination examination or oral examination 7 Prerequisite for the award of credit points: Module examination pass 8 Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.E.Mechanical Engineering B.Eng. and Mechatronics B.Sc. 9 Importance of the grade for the final grade: according to BRPO 10 Module coordinator: Prof. DrIng. Klaus Dürkopp 11 Other information: Literature will be announced at the beginning of the course.	3	way and	-						•		
Lecture, seminar lessons, practical exercises Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.F. Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. DrIng. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.				ment of product		ed on V		2221 22)22 amon	a others	1
Participation requirements: Formal: None Content: None Forms of assessment: Written examination, combination examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.I. Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. DrIng. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.		Method Planning sub-fun Idea ge evaluati	ical developi g, tasks, spec actions, funct eneration/cre on of alterna	ifications/requir ional structure, ativity process itive solutions, e	s (base ements -> Mei	s list, de thod o ion pro	DI 2206 evelopm verview ocedure	nentstruc , discurs s. Selecto	sturing -> (sive and ir ed develo	Overallfuntuitive r	unction nethod
Forms of assessment: Written examination, combination examination or oral examination Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.E. Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. DrIng. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.	4	Method Planning sub-fun Idea ge evaluati (e.g. cos	ical developi g, tasks, spec actions, funct eneration/cre on of alterna st-conscious teaching:	ifications/requir ional structure, ativity process itive solutions, e development, d	s (base ements -> Me evaluati lesign i	s list, do	DI 2206 evelopm verview ocedure	nentstruc , discurs s. Selecto	sturing -> (sive and ir ed develo	Overallfuntuitive r	unction nethod
Prerequisite for the award of credit points: Module examination pass Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.I. Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. DrIng. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.		Method Planning sub-fun Idea ge evaluati (e.g. cos Forms of Lecture Participat Formal:	ical developig, tasks, speciactions, functioneration/creon of alternation/creon of alternatic-conscious teaching: , seminar lession requireme	sifications/requirional structure, ativity process ative solutions, edevelopment, development, d	s (base ements -> Me evaluati lesign i	s list, do	DI 2206 evelopm verview ocedure	nentstruc , discurs s. Selecto	sturing -> (sive and ir ed develo	Overallfuntuitive r	unction nethod
Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Engineering Computer Sciences B.E. Mechanical Engineering B.Eng. and Mechatronics B.Sc. Importance of the grade for the final grade: according to BRPO Module coordinator: Prof. DrIng. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.	4 5	Method Planning sub-fun Idea ge evaluati (e.g. cos Forms of Lecture Participat Formal: Content:	ical developing, tasks, special developing, tasks, special developing, tasks, special developing and tender developing teaching: teaching:	sifications/requirional structure, ativity process ative solutions, edevelopment, development, d	s (base ements -> Me evaluati lesign i	s list, de thod o ion pro in acco	DI 2206 evelopm verview ocedures ordance	nent struction discurses. Selection with street	sturing -> (sive and ir ed develo	Overallfuntuitive r	unction nethod
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Module coordinator: Prof. DrIng. Klaus Dürkopp Other information: Literature will be announced at the beginning of the course.	5 6 7	Method Planning sub-fun Idea ge evaluati (e.g. cos Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Applicatio Biotech	ical developing, tasks, special developing, tasks, special developing, tasks, special developing, function of alternation assessment: None	cifications/requirional structure, ativity process ative solutions, expenses, practical expenses and of credit points pass alle (in the following instrumentation Expenses)	s (base ements -> Me evaluati lesign i exercise aminat	s list, do thod o ion pro in acco es prograr ering B	DI 2206 evelopm overview ocedures ordance oral exar	discurs s. Selector with stres	eturing -> (sive and ir ed develo sses)	Overall function tuitive representation of the control of the cont	unction methoc uideline
Other information: Literature will be announced at the beginning of the course.	5 6 7 8	Method Planning sub-fun Idea ge evaluati (e.g. cos Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Applicatio Biotech Mechar	ical developing, tasks, special citions, functions, function and iternation of alternation of the modunology and linical Engineer in terms of the grade of the gr	cifications/requirional structure, ativity process ative solutions, extive solutions, extive solutions, extive solutions, extive solutions, extive sons, practical extincts: Combination extinct of credit points pass le (in the following instrumentation Exting B.Eng. and I	s (base ements -> Me evaluatilesign i	s list, do thod o ion pro in acco es prograr ering B	DI 2206 evelopm overview ocedures ordance oral exar	discurs s. Selector with stres	eturing -> (sive and ir ed develo sses)	Overall function tuitive representation of the control of the cont	unction methoc uideline
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12 Language: German	5 6 7 8	Method Planning sub-fun Idea ge evaluati (e.g. cos Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Applicatio Biotech Mechar Importan accordi Module of Prof. Dr. Other info	ical developing, tasks, special developing, tasks, special developing, tasks, special developing teaching: teaching: teaching: seminar lession requireme None assessment: examination, site for the aware examination on of the modulinology and limical Engineer depends to BRPO experience of the grading to BRPO exp	cifications/requirional structure, ativity process ative solutions, exitive solutions, practical exities exi	s (base ements -> Me evaluati lesign i xercise aminat : g study Enginee Mecha e:	s list, do	DI 2206 evelopm overview ocedures ordance oral exar mmes) .Sc., Eng	discurs s. Selective with stress mination	eturing -> (sive and ir ed develo sses)	Overall function tuitive representation of the control of the cont	unction methox uidelin

Col	loquium											KOL	
lden num	tification ber:	Workl	oad:		Credits:	Study	semes	ter:		requency ffer	of the	Duration):
129	0	90 h			3	6th seme	or ester	7th	ea	ach sem	ester		
1	Course:			Pla	anned group si	zes	Scope	 1		Actual co time / cla teaching		Self-study	У
	Lecture			60) students		0	weekly hours	/	0	h	90	h
	Seminar	lessons		30) students		0	weekly hours	/	0	h	0	h
	Exercise			20) students		0	weekly hours	/	0	h	0	h
	Practical	or semi	nar	15	students		0	weekly hours	/	0	h	0	h
	Supervise	ed self-:	study	60) students		0	weekly hours	/	0	h	0	h
3	and its r		oject-r	ela	ted reference	es, as v	vell as	assessi	ing	gitssigni	ificance	for practic	e.
	- D	isputa	tion on	the	esis according e procedure i ext of the thes	n the p			the	e thesis a	and the c	questions t	hat
4	Forms of	teachin	g:		bachelor the								
5	Participat		uiremer	nts:		0.0							
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6	Forms of	assessr		1110	THE DAC	i iCiOi t	110313						
	Oral exa												
7	Prerequis	ite for t	he awaı	rd o	f credit points:								
8	Applied Engined Mechat B.Sc.	Mathering Barronics	ematics Eng., E B.Sc., F	B. Ing Rer	n the following Sc., Biotechr ineering Cor newable Ener	nology nputer gies B	and Ir	nstrume ces B.E	ะทธุ	g., Mech	anical Er	nginæring	g B.Eng.,
9			-	for	the final grade):							
10	Module o												
11	N.N. Other info	ormation	า:										
			e anno	our	iced at the be	eginnir	ng of th	e cours	se.				
12	Language German												
	German	l											

1.1	struction	Basics								KG	
Ident numk	tification ber:	Workloa	ad:	Credits:	Stud	y semes		Frequence offer	cy of the	Duratio	n:
1129)	150 h		5	1st s	emest	er	Annual	(Winter)	1 sem	ester
1	Course:		F	lanned group	sizes	Scop	e		contact classroom	Self-stud	dy
	Lecture		6	0 students		2	weekly hours	30	h	45	h
	Seminar	lessons	3	0 students		1	weekly hours	15	h	22.5	h
	Exercise		2	0 students		0	weekly hours	0	h	0	h
	Practical	or semina	ar 1	5 students		1	weekly hours	15	h	22.5	h
	Supervise	ed self-sti	udy 6	0 students		0	weekly hours	0	h	0	h
3	with the Studen creating Contents Standa surface	cCAD sy ts can str g design :: rdisation s. Funda	stem. ructure docum . Drawir mental:	complex cor entation ng reading. D s of Materials metric data.	nstruction Vimensions Significations	ons ind onal, sh	epende ape and acture ar	ntly and position	have mast altolerand oning of C	tered the l ces. Fits. T ADsyste	echnic ms.Inp
4	Forms of	ls of desi teaching:									
5		, exercis tion requi		ticalcourse							
J	Formal:		None None								
		assessme									
6			ent:								
			ntion, pe	erformance e		ntion or	oral exa	minatior	١		
	Prerequis Module	site for the examina	ation, pe e award ation pa	of credit point assand cours	s: se asse:	ssmen	t	mination	1		
7	Prerequis Module Application	site for the examination of the	ation, pe e award ation pa module	of credit point	s: se asse: g study	ssmen prograr	t mmes)			Sc.	
7	Prerequis Module Application Biotech Importan	site for the examination of the inclogy and the	ation, pe e award ation pa module and Inst grade fo	of credit point issand cours (in the followin	s: se asse: g study Engine	ssmen prograr	t mmes)			SC.	
7 8 9	Prerequis Module Application Biotech Importan accordi Module	site for the examination of the unology and the ing to BR coordinate	ation, pe e award ation pa module and Inst grade fo PO or:	of credit point ass and cours (in the followin rumentation or the final grad	s: se asse: g study Engine	ssmen prograr	t mmes)			C.	
7 8 9	Prerequis Module Applicati Biotech Importan accordi Module Prof. Dr	examination of the inclosure of the inclosure of the ing to BR	ation, pe e award ation pa module and Inst grade fo PO or:	of credit point ass and cours (in the followin rumentation or the final grad	s: se asse: g study Engine	ssmen prograr	t mmes)			Cc.	
6 7 8 9 10	Prerequis Module Applicatic Biotech Importan accordi Module Prof. Dr Other inf Literatu standar	examination of the examination of the inclogy and the inclosure of the ing to BR coordinate. Ing. He formation: tre: Hoiserds	ation, per e award ation par module and Inst grade for PO or: rbert Fu	of credit point ass and cours (in the followin rumentation or the final grad	s: se asse: g study Engined de:	ssmen prograr ering B	t mmes) .Sc. and sch: Tec	Mechat hnische	ronics B.S		DIN

	hematics	1							MA1	
Iden num	tification ber:	Workload:	Credits:	Study	/ semes		Frequency offer	of the	Duration:	
1149)	150 h	5	1st se	emeste	er	Annual (V	Vinter)	1 sem	nester
1	Course:	l	Planned group	sizes	Scop	е	Actual co	assroom	Self-study	
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar	lessons	30 students		2	weekly hours	30	h	45	h
	Exercise		20 students		0	weekly hours	0	h	0	h
	Practical	or seminar	15 students		0	weekly hours	0	h	0	h
	Supervise	ed self-study	60 students		0	weekly hours	0	h	0	h
		-	msand algebra	ic eaua	ations, a	amount	equations	;		
	- L	imit value an nportant fun	unctions and cu d continuity ctional classes abers and their a	rves, ba	asic ter		oqualioni			
	- L - Ir - C - D	imit value an mportant fund Complex num Differentiating ntegration	d continuity ctional classes abers and their a g a function and	rves, ba	asicter ion	rms				
4	- L - Ir - C - D - Ir	imit value an mportant fund Complex num Differentiating ntegration Application to teaching:	d continuity ctional classes abers and their a g a function and technical issue	rves, ba applicat its rules	asicter ion	rms				
4	- L - Ir - C - Ir - Ir - A Forms of Lecture	imit value an important function plex num differentiating application to teaching: it eaching: it, seminar lessition requirement important plessition requirement plessition requirement important plessition requirement plessition requirement plessition	d continuity ctional classes bers and their a g a function and technical issue sons with exerci	rves, ba applicat its rules is	asic ter	ms e discus				
5	- L - Ir - C - Ir - Ir - Ir - A Forms of Lecture Participat Formal: Content: Forms of	imit value and mportant fund Complex num Differentiating Integration to teaching: a, seminar lessition requiremed None Room Room Room Room Room Room Room Roo	d continuity ctional classes abers and their a g a function and technical issue sons with exerci nts: e wledge of schoo	rves, band pplicate its rules is ses	ion s, curve	e discus	sion			
	- L - Ir - C - Ir - Ir - A Forms of Lecture Participat Formal: Content: Forms of Written Prerequis	imit value and important fund complex num differentiating attention to teaching: a, seminar less tion requiremed None Known assessment: examination, site for the away important fundaments and important in the semination, site for the away important in the semination, in the semination, in the semination is the semination, in the semination is the semination in the semination, site for the away important fundaments in the semination in the	d continuity ctional classes abers and their a g a function and technical issue sons with exerci nts: e wledge of school combination ex ard of credit points	rves, ban pplicatits rules is sises	ion s, curve	e discus	sion			
5 6 7	- L - Ir - C - Ir - Ir - A Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Application	imit value an important function plex numbifferentiating integration to teaching: a pplication to teaching: a seminar lession requiremed	d continuity ctional classes abers and their a g a function and technical issue sons with exerci nts: e wledge of school combination ex ard of credit points pass ule (in the following	rves, band pplicate its rules is ses is es caminate is:	ion s, curve	e discus	sion		C.	
5 6 7	- L - Ir - C - Ir - Ir - A Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Application Biotech Importan accordi	imit value and important fund complex num differentiating integration to teaching: It is, seminar less ton requiremed in the modulation of the modulation of the grading to BRPO	d continuity ctional classes abers and their a g a function and technical issue sons with exerci nts: e wledge of school combination ex ard of credit points pass	rves, band pplicate its rules is is es is es	ion s, curve	e discus	sion		C.	
5	- L - Ir - C - Ir - Ir - A Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Applicatio Biotech Importan accordi Module of Prof. Dr.	imit value and important fund complex num differentiating integration to teaching: It is, seminar less ton requirement in the modulation of the modulation of the grade inclogy and lince of the grade important in the modulation of the grade inclogy and lince of the grade important in the modulation of the grade inclogy and lince of the grade in the modulation in the grade inclogy and lince of the grade in the modulation in the grade in the gra	d continuity ctional classes abers and their a g a function and technical issue sons with exerci nts: e wledge of school combination ex ard of credit points pass ule (in the following nstrumentation is e for the final grace	rves, band pplicate its rules is is es is es	ion s, curve	e discus	sion		C.	

Ma	thematics	2								MA2	
	ntification nber:	Workload:		Credits:	Study	y semes	ster:	Frequer offer	ncy of the	Durati	on:
115	5	150 h		5	2nd	semes	ster	Annua	l (Summer)	1 sem	nester
1	Course:	1	Pla	anned group s	izes	Scop	e		l contact classroom ing	Self-stu	ıdy
	Lecture		60) students		2	weekly hours	30	h	45	h
	Seminar	lessons	30) students		2	weekly hours	30	h	45	h
	Exercise		20) students		0	weekly hours	0	h	0	h
		or seminar	15	students		0	weekly hours	0	h	0	h
	Supervised self-study Learning outcomes/col			60 students		0	weekly hours	0	h	0	h
3	The abil		bstr	actly and the	comp	etence	e to find	solutior	sciences us	er develo	ped.
3	Contents - B - L - L	lity to think a : asic concep inear algebo inear syster	ots o ra: C ns of	actly and the f vector algek alculator ope equations ar differential ca	ora and ration nd eige	d appli with ve envalue	cations ectors a e proble	in geon nd m <i>a</i> tr ems	<u>ns are furthe</u> netry	er develo	ped.
	Contents - B - L - L - N - Ir Forms of	lity to think a : asic concep inear algebrainear syster fultidimensi ategration of teaching:	ots or ra: C ns of onal f rota	f vector algebalculator ope equations ar differential ca tionally symr	ora and ration nd eige alculus metrica	d appli with ve envalue swith a	cations ectors a e proble pplicati	in geon nd matr ems ons	<u>ns are furthe</u> netry	er develo	pped.
3	Contents - B - L - L - N - Ir Forms of Lecture	lity to think a : asic concep inear algebration system fultidimension tegration of teaching: , seminar less	ots or ra: C ns of onal f rota	f vector algebalculator ope equations ar differential ca	ora and ration nd eige alculus metrica	d appli with ve envalue swith a	cations ectors a e proble pplicati	in geon nd matr ems ons	<u>ns are furthe</u> netry	er develo	ped.
4	Contents - B - L - L - N - Ir Forms of Lecture	lity to think a : asic concep inear algebrainear syster fultidimensi ategration of teaching:	ots or ra: C ns of onal f rota sson: ents:	f vector algebalculator ope equations ar differential ca tionally symr	ora and ration nd eige alculus metrica	d appli with ve envalue swith a	cations ectors a e proble pplicati	in geon nd matr ems ons	<u>ns are furthe</u> netry	er develo	ped.
4	Contents - B - L - L - N - Ir Forms of Lecture, Participat	lity to think a : asic concepinear algebra inear system fultidimensintegration or teaching: , seminar lestion requirem Nor	ots of ra: C ns of onal f rota ssons ents:	f vector algebalculator ope equations ar differential ca tionally symr	ora and ration nd eige alculus metrica	d appli with ve envalue swith a al bodie	cations ectors a e proble pplicati	in geon nd matr ems ons	<u>ns are furthe</u> netry	er develo	ped.
4	Contents - B - L - L - N - Ir Forms of Lecture, Participat Formal: Content: Forms of	ity to think a : asic conceptinear algebrates algebrate	ots or ra: C ns of onal f rota ssons ents: ne nt M	f vector algebral culator oper equations are differential cartionally symmes with exercise athematics 1	ora and ration and eige alculus metrica ses	d appli with ve envalue swith a al bodie	cations ectors and e proble applications, arc le	in geon nd matr ems ons engths,	ns are furthe netry ices	er develo	ped.
4 5	Contents - B - L - L - N - Ir Forms of Lecture Participat Formal: Content: Forms of Written	ity to think a : asic conceptinear algebra inear system fultidimensintegration of teaching: , seminar lession requirem	ots or ra: C ns of onal f rota ssons ents: ne nt M	f vector algeloal alculator oper equations are differential cartionally symmes with exercise athematics 1	ora and ration and eige alculus metrica ees (1149)	d appli with ve envalue swith a al bodie	cations ectors and e proble applications, arc le	in geon nd matr ems ons engths,	ns are furthe netry ices	er develo	ped.
4 5	Contents - B - L - V - Ir Forms of Lecture Participat Formal: Content: Forms of Written Prerequis	inear algebration of teaching: , seminar lession requirem Nor Everassessment: examination of the away Everassessment: examination of the away Everassessment: E	onts of considering the constant of the cons	f vector algebral culator operations are differential castionally symmes with exercise athematics 1 mbination exact credit points:	ora and ration and eige alculus metrica ees (1149)	d appli with ve envalue swith a al bodie	cations ectors and e proble applications, arc le	in geon nd matr ems ons engths,	ns are furthe netry ices	er develo	ped.
4 5 6	Contents - B - L - V - Ir Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Application	lity to think a : assic conceptinear algebra inear system fultidimension teaching: , seminar lession requirem	onts or a: C ans of onal frotal frotal sson: ents: ne nt M and correct or passible (in passible	f vector algebral alculator operations are differential cartionally symmetric swith exercises athematics 1 mbination example and the following of credit points:	ora and ration and eige alculus metrica ses (1149) aminat	d appli with ve envalue swith a al bodie	cations ectors and proble applications es, arcle cral exa	in geon nd matr ems ons engths, minatio	netry ices		ped.
4 5 7 8	Contents - B - L - L - N - Ir Forms of Lecture, Participat Formal: Content: Forms of Written Prerequis Module Applicatio Biotech	inear algebration of the awarination of the moon nology and ce of the gradien in the gradient of the awarination of the moon nology and ce of the gradient is assessment:	onts or a: C ra: C	f vector algebral culator operations are differential castionally symmes with exercise athematics 1 mbination examples are differed to points:	ora and ration and eige alculus metrica ses (1149) aminat	d appli with ve envalue swith a al bodie	cations ectors and proble applications es, arcle cral exa	in geon nd matr ems ons engths, minatio	netry ices		ped.
4 5 7 8 9	Contents - B - L - L - N - Ir Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Application Biotech Important accordi	lity to think a : lasic conception and algebra inear system fultidimension tegration of teaching: lase seminar lession requirem Nore Event assessment: examination of the moon of the moon nology and	onts or a: C ra: C	f vector algebral culator operations are differential cartionally symmetrionally symmetrics athematics 1 mbination example of credit points: as in the following umentation E	ora and ration and eige alculus metrica ses (1149) aminat	d appli with ve envalue swith a al bodie	cations ectors and proble applications es, arcle cral exa	in geon nd matr ems ons engths, minatio	netry ices		ped.
4 5 7 8 9	Contents - B - L - L - N - Ir Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Application Biotech Important accordi Module of Prof. Dr.	inear algebrainear algebrainear system fultidimension teaching: , seminar lession requirem Nor Evenus assessment: examination on of the awa examination on of the moon on of the grading to BRPO ecoordinator: Ing. Rolf Name assessment: assessment: by assessment: condition of the moon of the moon of the grading to BRPO ecoordinator: Ing. Rolf Name assic concepts assic con	onts or ra: C ras of onal f rota sson: ne nt M n, cor rard on pas dule (i Instr	f vector algelial culator ope equations are differential cationally symmetrionally symmetrionally symmetrionally symmetrion example of credit points: as in the following umentation Extending practical contents of the final grade of the final	ora and ration and eige alculus metrica ses (1149) aminat	d appli with ve envalue swith a al bodie	cations ectors and proble applications es, arcle cral exa	in geon nd matr ems ons engths, minatio	netry ices		ped.
4 5 6 7 8 9	Contents - B - L - L - N - Ir Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Applicatio Biotech Importan accordi Module of Prof. Dr. Other info	inty to think a asic conceptinear algebra inear syster fultidimension teaching: , seminar lestion requirem Nor Evenus assessment: examination on of the modern of the grading to BRPO coordinator: -Ing. Rolf Nation: re will be an	onts or a: C ans of onal frotal frotal sson: ents: ne and control frotal	f vector algelial culator ope equations are differential cationally symmetrionally symmetrionally symmetrionally symmetrion example of credit points: as in the following umentation Extending practical contents of the final grade of the final	ora and ration and eige alculus metrica ses (1149) aminat study nginees:	d appli with ve envalue swith a al bodie tion or o	cations ectors and problem pro	in geon nd matrems ons engths, minatio	netry ices netronics B.S.	C.	
	Contents - B - L - L - N - Ir Forms of Lecture Participat Formal: Content: Forms of Written Prerequis Module Applicatio Biotech Importan accordi Module of Prof. Dr. Other info	inty to think a assic conception and algebra inear algebra inear system fultidimension or teaching: , seminar lession requirem Nor Evenument in the away examination on of the moon of the moon of the grading to BRPO decordinator: Ing. Rolf Nature und Nature und Nature und Nature in the semination of the and the grading to BRPO decordinator: Ing. Rolf Nature und Nature und Nature und Nature in the semination of the and the grading to BRPO decordinator: The will be an und Nature und Nature und Nature und Nature in the semination of the grading to BRPO decordinator: The will be an und Nature und	onts or a: C ans of onal frotal frotal sson: ents: ne and control frotal	f vector algebral culator operations are differential captionally symmetric	ora and ration and eige alculus metrica ses (1149) aminat study nginees:	d appli with ve envalue swith a al bodie tion or o	cations ectors and problem pro	in geon nd matrems ons engths, minatio	netry ices netronics B.S.	C.	

Mat	thematics	3							МАЗ	
lden num	itification iber:	Workload:	Credits:	Study	/ semes		Frequency offer	y of the	Duratio	n:
116	0	150 h	5	3rd s	semest	er	Annual (\	Winter)	1 seme	ester
1	Course:		Planned group	sizes	Scop	е	Actual of time / cl teaching	assroom	Self-stuc	dy
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar I	essons	30 students		2	weekly hours	30	h	45	h
	Exercise 20 students			0	weekly hours	0	h	0	h	
	Practical	or seminar	15 students		0	weekly hours	0	h	0	h
	Supervise	ed self-study	60 students		0	weekly hours	0	h	0	h
2	Learning	outcomes/cor	npetences:		I				ı	
			able to apply of ical problems a		•					ematic
3	Contents									
3			ordinan diffor	ntialac	au ation	o of tot	ordor one	l thair a alı	ıtiono	
		-	ordinary differe						ulions	
			ntial equations o					ridents		
			mechanicsand				-			
	- S	ystems of lin	ear differential e	equatio	ns with	consta	ntcoeffic	ient		
	- S	olution with t	he help of eiger	nvalues	andei	genvect	tors			
	- N	umerical sol	ution methods fo	or non-	linear	different	ialequati	ons		
	- D	escription of	functions and [DGLint	he Lap	olace do	main			
	- In	troduction to	o Vector Analysi	is						
4	Forms of	teaching:	·							
			sons with exerci	ses						
5		ion requireme								
	Formal:	Non								
	Content:		ule Mathematic	s2(115	5)					
6		assessment:	a a ma la ima ati a ma a v			aral avar	no in otion			
7			combination ex		.IOH OF C	orai exai	nination			
1		examination	•	•						
8			ule (in the following	a studv	progran	nmes)				
0			nstrumentation E		-	-	Mechatr	onicsB.S	C.	
9			e for the final grad							
	according to BRPO									
10										
		-Ing. Rolf Na	umann							
11	Other info									
		Literature will be announced at the beginning of the course. Papula, Lothar, Mathematik für Ingenieure und Naturwissenschaftler, Bd. 2 und Bd. 3							nd Bd. 3	
12	Language	9:								

	asuring Te	echnology							MT	
Iden num	itification iber:	Workload:	Credits:	Study	y semes		Frequency offer	of the	Duration:	
1168	8	150 h	5	3rd s	semest	er	Annual (V	Vinter)	1 seme	ester
1	Course:	l	Planned group	sizes	Scop	e	Actual co time / cla teaching		Self-study	
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar lessons 30 students 1				1	weekly hours	15	h	22.5	h
			0	weekly hours	0	h	0	h		
		Practical or seminar 15 students			1	weekly hours	15	h	22.5	h
2		ed self-study outcomes/cor	60 students		0	weekly hours	0	h	0	h
3	errors, r	e of measure measuremen signals, gene	ment, SI units, s t uncertainties, ral aspects for t	disturb the sele	ance v ection a	ariables and use	s and their of transd	reducti ucers, tir	on, analo ne and fre	gue and equenc
	measur force,	ement, currei torque, tem	nt, voltage and perature and ue processing.	oower m	neasure	ement, le	ength, ang	le and str	ain meas	uremen
4	Forms of	teaching:	sons with exerc	ises and	dproje	cttasks	, practical	course		
	Б .: :				аргојо	ot taono,	•			
5		tion requireme				or taoko,				
	Formal: Content:	None None	9							
6	Formal: Content: Forms of Written	None assessment: examination,	e e combination ex				ce examiı		oral exam	nination
6	Formal: Content: Forms of Written Prerequis Module	None assessment: examination, site for the awa examination	e combination early of credit points pass and cours	s: se asse:	tion, pe	erforman t	ce examiı		oral exam	nination
6	Formal: Content: Forms of Written Prerequis Module Application Biotech	None None assessment: examination, site for the awa examination on of the modu	combination ex and of credit points pass and cours ule (in the followin enstrumentation	s: se asse: g study Enginee	tion, pe ssment progran	erforman t nmes)		nation or		
6	Formal: Content: Forms of Written Prerequis Module Applicatic Biotech Enginee	None assessment: examination, site for the awa examination on of the modu nology and li ering and Ma	combination ex rd of credit points pass and cours ule (in the followin	s: se asse: g study Enginee	tion, pe ssment progran	erforman t nmes)		nation or		
6 7 8	Formal: Content: Forms of Written Prerequis Module Application Biotech Enginee Important accordi Module	None None assessment: examination, site for the awa examination on of the modu	combination ex and of credit points pass and cours alle (in the followin- enstrumentation magement B.Sc e for the final grad	s: se asse: g study Enginee	tion, pe ssment progran	erforman t nmes)		nation or		
6 7 8	Formal: Content: Forms of Written Prerequis Module Application Biotech Enginee Important accordi Module of Prof. Dr. Other inf	None assessment: examination, site for the awa examination on of the mode inclogy and liering and Ma ice of the grade ing to BRPO coordinator: Dr. Andrea E ormation:	combination ex and of credit points pass and cours alle (in the followin- enstrumentation magement B.Sc e for the final grad	s: se asse: g study Engined de:	ssment prograr ering B	erforman t nmes) .Sc., Me	chatronics	nation or		

Phot	conics								PHO	
Ident	ification	Workload:	Credits:	Study	semes	ter:	Frequency	of the	Duratio	n:
1309		150 h	5	4th seme	or ester	6th	offer Annual (S	Summer)	1 seme	ester
1	Course:		Planned group s	izes	Scope	е	Actual co		Self-stuc	dy
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar I	essons	30 students		0	weekly hours	0	h	0	h
	Exercise 20 students 1 weekly 15 hours				15	h	30	h		
	Practical or seminar 15 students 1 weekly 15 hours		h	15	h					
	Supervise	ed self-study	60 students		0	weekly hours	0	h	0	h
3	light tec Name the photonical light-ge solution Contents: Historical laws and optics, vo optical product Forms of Lecture,	hnology, lase ne most imposes and developmenting and sin applicational all overview and standards. wave optics, beam pathstion technologies. exercise and	ply the basic meer technology an ortant areas of a opments driven I light-directing on areas of photomorphotom	dtechi applica by ph componics. lopme nsitivity ser effe ptical cessin	ents in a pect, ho labora	ptics. Jnderst s. Ident s. Enabl optics, o ohotom lograph atory sy	anding the tify, interpose the devolutions definitions etric radiators and interpose the control of the title	e practica ret and d elopmen of terms tion equi erferome pplication	al signific esign int t of indep , quantitic valent, ge stry, simul ns in me	cance of eracting pendent es, units, eometric lation of etrology,
5	Formal:	ion requireme	nts:							
6	Written	ation	combination exa	aminat	ion, pe	rformar	nce examiı	nation, pr	oject worl	k or oral
7	Module	examination	rd of credit points: pass and course	e as ses	s <u>m</u> ent	t				
8	Application	on of the modu	lle (in the following nstrumentation E	study į	progran	nmes)	l Mechatro	onicsB.Sc	C.	
9		ce of the grade	e for the final grade) :	_					
10	Module of Prof. Dr. Other info The cou	coordinator: -Ing. Reinhal ormation: rse material i on of picture	s summarised in s and a collecti			•				-
12	Language German	э:	lecture hour.							

Phys	sics								PHY	
Ident	ification	Workload:	Credits:	Stud	y semes		Frequency	y of the	Duration	า:
1319		150 h	5	2nd	semes		offer Annual (S	Summer)	1 seme	ster
1	Course:	L	Planned group	sizes	Scop	oe	Actual c time / cl teaching	assroom	Self-study	у
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar	lessons	30 students		1	weekly hours	15	h	30	h
	Exercise		20 students		0	weekly hours	0	h	0	h
		or seminar	15 students		1	weekly hours	15	h	15	h
2		ed self-study outcomes/con	60 students		0	weekly hours	0	h	0	h
3	thermod Scientif Contents Mechar differen	dynamics, vib ic performan : nics (kinemat t forces, wor	cal processes rations, optics a ce and analysis ics: one and three, energy, powamics: continui	of exp ree-dir	oustics erimen mensio mentur	tsto veri nal trans m. Fluid	fy theore slation; dy mechani	tical facts ynamics: N	Newton's	axioms, ressure,
	friction). Thermocircular Oscillat superpo	dynamics (te processes, p ions and wa osition of osci geometric: re	mperature, hea hase transitions aves (free dan llations, harmor eflection, refract ve, sound level,	at, therr s). nped a nic wav tion, ler	mal exp and ur es, Dop nses; wa	pansion, ndampe opler effi ave optid	gas laws ed oscilla ect, interfe	s, internal itions, for ference, di erence, dif	energy, e ced osci iffraction).	entropy, Ilations,
4	Forms of Lecture		sons with exerci	ises an	dproje	ct tasks,	practica	Icourse		
5	Formal: Content:	ion requireme	nts:							
6	Written		or oral examina rd of credit points							
7	Module	examination	pass and cours le (in the following	e asse						
9	Biotech	nology and Ir	nstrumentation I for the final grad	Engine			Mechatr	onicsB.Sc	D	
10	accordi Module d	ng to BRPO coordinator: Dr. Andrea E								
11	Other info	ormation:								
12	Language German									

Prac	ctical Proje	ect/Internsh	ip						PRA	
Iden num	tification ber:	Workload:	Credits:	Study	/ semes		Frequency offer	of the	Duratio	n:
130	5	900 h	30	7ths	emest	er	each sem	nester	20 we	eks
1	Course:		Planned group s	sizes	Scop	e	Actual continue / classroom	m	Self-stud	dy
	Lecture				0	weekly hours	0	h	900	h
	Seminar lessons 30 stud		30 students		0	weekly hours	0	h	0	h
	Exercise	Exercise 20 stude			0	weekly hours	0	h	0	h
	Practical	or seminar	15 students		0	weekly hours	0	h	0	h
	Supervised self 6 study Learning outcomes/compe		60 students		0	weekly hours	0	h	0	h
3	include prepare	tents result t an engineeri a record of s are to be	from the field of ng task. At the e activities and th individually and	end of th	ne prac ents a	ctical pr final rep	oject, the ort. Durin	supervis g the pra	ing comp actical pro	any is to oject, the
4	Forms of	teaching:								
	Semina	r lessons with	n exercises as ac	ccompa	anying	guidan	ce			
5	Participat Formal: Content:	ion requireme Non Non	е							
6	Forms of Term pa	assessment:								
7	Prerequis		ard of credit points pass	:						
			ule (in the following	r ctudy	prograr					
8				-	erina B	.Sc.				
8	Biotech Importan	nology and li ce of the grad	nstrumentation E e for the final grad	ngine	ering B	.Sc.				
	Biotech Importan accordi Module o	nology and lice of the gradeng to BRPO coordinator:	nstrumentation E e for the final grad	ngine	ering B	.Sc.				
9	Biotech Important accordi Module of Prof. Dr. Other info	nology and loce of the grading to BRPO coordinator: Ing. Anton Pormation:	nstrumentation E e for the final grad	Enginee e:			e.			

Qua	ility Mana	gement								QM	
Ident numb	ification per:	Workload:		Credits:	Study	semes	ter:	Frequency offer	of the	Duration	:
1229)	150 h		5 4th or Planned group sizes		or 6th sem.		Annual (Summer)		1 sem.	
1	Course:		Pl	anned group s	izes	Scope	Э	Actual co time / cla teaching		Self-study	,
	Lecture		60 students		2	weekly hours	30	h	45	h	
	Sem. less	sons	30) students		2	weekly hours	30	h	45	h
	Exercise		20) students		0	weekly hours	0	h	0	h
	Practical or seminar		15	students		0	weekly hours	0	h	0	h
	Supervise	ed self-study	60) students		0	weekly hours	0	h	0	h

2 Learning outcomes/competences:

The students are able to

- Define the basic concepts of quality theory.
- Explain the basics of building a quality management system.
- Implement standard requirements for a quality management system in a familiar field of work by being able to identify requirements, formulate goals and describe processes based on the defined terms and principles of quality management.
- Make important business decisions based on basic, relevant statistical methods.
- Classify the industrial application of quality methods and techniques in the product creation process.
- Master the essential quality methods and techniques, such as FMEA, QFD, Poka Yoke, SPC, test planning.
- Understand the systematic and structured application of basic methods from the scope of quality management in the context of improvement projects.
- Systematically identify, eliminate and avoid the causes of errors by selecting and applying the appropriate methods for data collection, data analysis and root cause identification for the intended purpose in order to subsequently react and preventively solve quality problems.
- Assess the role of quality management in development, procurement and production.
- Analyse significant variables and risks with regard to the quality level of a production.
- Evaluate and analyse quality data from production and derive measures for production process optimisation.
- Highlight legal aspects of warranty and product liability.

3 Contents:

1 Understanding quality

- The term quality
- Quality and its characteristics
- Quality management

2 Quality management systems

- Standards and models for QM systems
- ISO 9000 series of standards
- Process orientation

3 Quality tools

- Data collection tools

- Tools for data analysis
- 4 Management and creativity tools
 - Management tools (M7)
 - Creativity tools (K7)

5 Quality management in development

- Kano model
- Quality Function Deployment
- FMEA

6 Statistical design of experiments

- Classical design of experiments
- Optimum search procedure
- Robust processes according to Taguchi
- Improvement strategies according to Shainin

7 Quality controlling

- Quality cost models
- Quality cost accounting

8 Quality management in procurement

- Definition of procurement strategies
- Factors of supplier selection
- Negotiate quality management contracts
- Initial sample testing
- Incoming goods inspection

9 Statistical methods in quality management

- Sampling and population
- Distributions
- Visualisation of data
- Correlations
- Linear regression analysis

10 Six Sigma

- Introduction to Six Sigma
- DMAIC cycle as a systemic approach

11 Quality management in production

- Quality testing
- Test equipment management
- Proof of suitability of measuring systems
- Statistical process control

12 Quality management during field use

- Field data management
- Isochronous diagram
- Weibull analysis

	- Weibuli ali aliysis							
4	Forms of teaching	g:						
	Lecture, sem. l	essons, supplemented by guest lectures						
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	Forms of assessi	ment:						
	Written exami	nation, combination examination or oral examination						
7	Prerequisite for t	he award of credit points:						
	Module exami	nation pass						
8	Application of th	e module (in the following study programmes)						
	Biotechnology	and Instrumentation Engineering (B.Sc.), Engineering Computer Sciences						
	(B.Eng.) and M	echatronics (B.Sc.)						
9	Importance of th	e grade for the final grade:						
	according to B	BRPO						

Please note: The German version of this document is the legally binding version. The English translation provided here is for information purposes only.

10	Module coordinator:
	Prof. DrIng. Magnus Horstmann
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

Aut	omatic Co	ontrolEngine	ering						RT	
Identification number: 1234		Workload:	Credits:	edits: Study semester: Frequency of the offer			of the	Duratio	n:	
		150 h	5	4th s	semest	er	Annual (Summer)		1 semester	
1	Course:		Planned group	sizes	Scop	e	Actual continued time / classifications	assroom	Self-stud	dy
	Lecture		60 students		2	weekly hours	30	h	45	h
	Seminar	lessons	30 students		1	weekly hours	15	h	22.5	h
	Exercise		20 students		0	weekly hours	0	h	0	h
		or seminar	15 students		1	weekly hours	15	h	22.5	h
	,	ed self-study outcomes/cor	60 students		0	weekly hours	0	h	0	h
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	apply the practical	he basic me al significanc	ans of describ	ractical ing and nnology	signifid analy 1. Enab	cance o sing tealethede	f control e chnical p evelopme	engineeri rocesses nt of inde	ng. Desc . Unders pendent:	cribe and tand the solutions
3	apply the practical in simple. Contents Fundamedescripelement	he basic me al significanc e and the sys : nentals of co tion, transfer ts, frequency	ans of describ e of control tecl	ractical ing and nnology for a wid ng, com malisat transfei	signific d analy . Enab de rang ponen ion an	cance o vsing tea le the de ge of cor ts of cor d linear ents, loc	f control echnical prevelopmentrol engir	engineeri rocesses nt of inde neering a neering, a me beha s, Bode o	ng. Desc . Unders pendent pplication amplifiers aviour of diagram,	cribe and tand the solutions ns. s, system transfe Laplace
3	apply the practical in simple. Contents Fundam descrip element transfor	he basic me al significance and the system that sof continuity that is a frequency m, analysis a loops, stabil	ans of describ e of control tecl stem is suitable ntrol engineering elements, nor behaviour of	ractical ing and anology for a widen a widen a widen a widen a malisate analog fanalog	signification signification and analytication and relementation an	cance o	f control echnical prevelopmentrol engirentrol engiren	engineeri rocesses nt of inde neering a neering, a me beha s, Bode o	ng. Desc . Unders pendent pplication amplifiers aviour of diagram, ents, simu	eribe and tand the solutions ns. s, system transfe Laplace ulation o
3	apply the practical in simple. Contents Fundamedescripelement transfor control control. Forms of	he basic me al significance and the system entals of contion, transfer ts, frequency m, analysis a loops, stabiliers.	ans of describ e of control tecl stem is suitable ntrol engineering elements, nor behaviour of and synthesis of	ractical ing and anology for a widen a widen a widen a widen a malisate analog fanalog	signification signification and analytication and relementation an	cance o	f control echnical prevelopmentrol engirentrol engiren	engineeri rocesses nt of inde neering a neering, a me beha s, Bode o	ng. Desc . Unders pendent pplication amplifiers aviour of diagram, ents, simu	eribe and tand the solutions ns. s, system transfe Laplace ulation o
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4	apply the practical in simple. Contents: Fundamedescripted element transforted controlled controlled participate. Formal: Content: Forms of Lecture Participate. Content: Forms of Written	he basic me al significance and the system of contion, transfer ts, frequency m, analysis a loops, stabiliers. teaching: , practicals a tion requireme None assessment: examination,	ans of describ e of control tecl stem is suitable ntrol engineering elements, nor global behaviour of ind synthesis of ity, discontinuous nd exercises ints: e e	ractical ing and nology for a widen malisate transfer analogous con	signific d analy Lenab de rang ponen ion an r eleme gue and trollers	cance o	f control echnical prevelopmentrol engination, tile control le controlle	engineeri rocesses nt of inde neering a neering, a me beha s, Bode o pop elemo rs, fuzzy	ng. Desc . Unders pendent pplication amplifiers aviour of diagram, ents, simu controlle	cribe and tand the solutions ns. s, system transfer Laplace ulation of ers, state
4 5	apply the practical in simple. Contents Fundamedescripelement transfore controle controle controle Forms of Lecture Participate Formal: Content: Forms of Written Prerequise Module	he basic me al significanc e and the sys e and the sys nentals of co tion, transfer ts, frequency m, analysis a loops, stabil ers. teaching: , practicals a tion requireme	ans of describ e of control tecl stem is suitable ntrol engineering r elements, nor g behaviour of and synthesis of ity, discontinuous nd exercises e e combination exercises pass and cours pass and cours	ractical ing and nology for a widen malisate transfer fanalogous con malisate transfer fanalogous con malisate se assesses assesses assesses assesses and malisate transfer fanalogous con malisate fa	significed analyte. Enabored ponention and trollers stion, pe	cance o vsing tea le the de ge of cor ts of cor d linear ents, loc d digital s, digital	f control echnical prevelopmentrol engination, tile control le controlle	engineeri rocesses nt of inde neering a neering, a me beha s, Bode o pop elemo rs, fuzzy	ng. Desc . Unders pendent pplication amplifiers aviour of diagram, ents, simu controlle	cribe and tand the solutions ns. s, system transfer Laplace ulation of ers, state
4 5 6 7	apply the practical in simple. Contents: Fundamedescripelement transfore controle controle. Forms of Lecture Participate Formal: Content: Forms of Written Prerequise Module Application Biotech	he basic me al significanc e and the sys nentals of contion, transfer ts, frequency m, analysis a loops, stabil ers. teaching: practicals a tion requirement None assessment: examination site for the awa examination on of the mode nology and li	ans of describe of control techstem is suitable of control techstem is suitable on the suitable of the suitabl	ractical ing and anology for a widenstant transfer fanalogous con examinates: see asses g study Engineer	significed analyte ana	cance o vsing ter le the de ge of cor ts of cor d linear ents, loc d digital s, digital erforman	f control echnical prevelopmentrol engirentrol engiren	engineeri rocesses nt of inde neering a neering, a me beha s, Bode o oop eleme rs, fuzzy	ing. Desc . Unders pendent: pplication amplifiers aviour of diagram, ents, simu controlle	cribe and tand the solutions ns. s, system transfer Laplace ulation of ers, state
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4 5 6 7 8	apply the practical in simple. Contents Fundamedescripelement transfore controlled controlled formal: Contents Forms of Lecture Participate Formal: Contents Forms of Written Prerequise Module Application Biotech Important according Module of Prof. Dr. Other info	he basic me al significance e and the system of the modern of the modern of the grading to BRPO coordinator: I he basic me al significant of the system of the system of the modern of the grading to BRPO coordinator: I he basic me al significant of the system of the system of the modern of the grading to BRPO coordinator: I he basic me al significant of the system of the system of the system of the grading to BRPO coordinator: I he basic me al significant of the system o	ans of describ e of control tecl stem is suitable Introl engineering relements, nor relements, nor relements of ind synthesis of ind synthesis of ity, discontinuous Indexercises Ints: E E Ints: E Ints: E Ints: E Ints: E Ints: E Ints: Interior of ind exercises Ints: Ints: Ints: Interior of ints: Ints: Interior of ints: In	ractical ing and annology for a widenstead in	significed analyte ana	cance o /sing tea /sing tea le the de ge of cor ts of cor d linear ents, loc d digital s, digital erforman t mmes) .Sc. and	f control echnical prevelopmentrol engirentrol engiren	engineeri rocesses nt of inde neering a neering, a me beha s, Bode o oop eleme rs, fuzzy	ing. Desc . Unders pendent: pplication amplifiers aviour of diagram, ents, simu controlle	cribe and tand the solutions ns. s, system transfe Laplace ulation of ers, state

Kob	otics								ROB					
Identification number:		Workload:	Credits: Stuc		udy semester:		Frequency of the offer		Duration:					
1240)	150 h	5	5th s	semest	ter	Annual (Winter)	1 seme	ester				
1	Course:		Planned group	sizes	Scop	e e	Actual of time / c	lassroom	Self-stuc	-study				
	Lecture		60 students		2	weekly hours	30	h	45 h					
	Seminar	lessons	30 students		1	weekly hours	15	h	22.5	h				
	Exercise		20 students		0	weekly hours	0	h	0	h				
		or seminar	15 students		1	weekly hours	15	h	22.5	h				
		ed self-study outcomes/con	60 students		0	weekly hours	0	h	0	h				
3	both the practical significance of robotics and different approaches to robot developm will encourage them to think and work independently in the field of robotics and applications. Contents: Teaching content: - Manipulators - Robot kinematics (incl. mathematical foundations) - Forward and inverse kinematics - Mobile robots - Sensors for mobile robots - Artificial intelligence and robotics													
	- Behaviour-based robotics - Learning robots													
4		teaching:	sons with exerc	iege nr	actical	COURS								
5		tion requirement		1000, pr	uctical	Course								
	Formal: None Content: Mathematics 1 and 2, Computer Science, Engineering Mechanics, El Engineering 1 and 2, Physics							nanics, Ele	ctrical					
6	Written	assessment: examination,	combination ex	xaminat		erforman	ce exam	ination or	oral exam	inatio				
7	Module	examination		se asses										
	Module examination pass and course assessment Application of the module (in the following study programmes) Biotechnology and Instrumentation Engineering B.Sc., Electrical Engineering B.Er Engineering Computer Sciences B.Eng., Mechatronics B.Sc. and Industrial Engin								_	g and				
8	Manag	ement B.Sc.			Importance of the grade for the final grade: according to BRPO									
	Manag Importar accord	ement B.Sc. nce of the grade ing to BRPO	e for the final grad	de:										
9 10	Manag Importar accord Module Prof. Dr	ement B.Sc. nce of the grade		de:										

12	Language:
	German

. 501	hnical Eng	lish							TEN		
number:		Workload:	Credits:	Study	/ semes	ster:	Frequency	of the	Duration	า:	
		150 h	5	5 4ths		semester		Annual (Summer)		ester	
1	Course:		Planned group s	sizes	Scop	e	Actual c time / cla teaching	assroom	Self-stud	Self-study	
	Lecture		60 students		0	weekly hours	0	h	0	h	
	Seminar I	essons	30 students		4	weekly hours	60	h	90	h	
	Exercise		20 students		0	weekly hours	0	h	0	h	
	Practical	or seminar	15 students		0	weekly hours	0	h	0	h	
		d self-study outcomes/cor	60 students		0	weekly hours	0	h	0	h	
3	- Me info esta esta esta esta esta esta esta esta	thodological ormation and ablish wider sonal comphentic English wider sonal comphentic English and attended attended attended attended processes sonal control processes attended attended processes attended atte	glish-speaking by a competence: I present them so contexts and make tence: They show the sources. Actively participate of the comperations; dimenometed systems interdisciplinary puct; managing possible compared to the competence of the competenc	They hortly a lake a coow English ate in in elevant ensions and Incoors y skills	are aband contritical allish flue termation termations and should be described by the control of	ole to sincisely lassessmency and onal coninology napes; for 4.0).	skim spe both in sp nent. da pro-ad nferences (e.g. n prces and	eaking ar ctive appro s. nanufactu Imechani	oach to maritir uring pro sms; prop	anaging cesses; erties of	
•			dividual and grou	up worl	k, etc. /	semest	er projec	t (Assignn	nent)		
	Participation requireme		nts:				participation				
5				(70%)	and ac	tive par	ticipation				
5	Participati Formal: Content:	Reg Engl	ular attendance ish language co	mpete	nce: B1			he Europe	ean Refer	ence	
	Formal: Content:	Reg Engl	ular attendance	mpete	nce: B1			he Europe	ean Refer	ence	
5	Formal: Content: Forms of	Reg Engl Fran	ular attendance ish language co nework for Langu	mpete	nce: B1			he Europe	ean Refer	ence	
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10	Module coordinator:
	Linda Schmidt
11	Other information:
	Literature will be announced at the beginning of the course. Textbook, additional materials, intranet self-study courses
12	Language:
	English

	tile Techn	ologies							TEX		
	ntification nber:	Workload:	Credits:	Stud	y semes	ster:	Frequeno offer	cy of the	Durati	on:	
600	04	150 h	5	4th sem	4th or 6 semester		Annual (Summer)		1 semester		
1	Course:		Planned group	o sizes	Scop	е		contact classroom ng	Self-stu	Self-study	
	Lecture		60 students		2	weekly hours	30	h	45	h	
	Seminar I	lessons	30 students		2	weekly hours	/ 30	h	45	h	
	Exercise		20 students		0	weekly hours	/ O	h	0	h	
	Practical	or seminar	15 students		0	weekly hours	0	h	0	h	
	Supervise	ed self-study	60 students		0	weekly hours	/ O	h	0	h	
3	Contents: Textile chain: primary spinning, secondary spinning, weaving, warp and weft knitting, braiding narrow textiles, finishing, manufacture; textile machines; sustainability in the textile chair intelligent/functional textiles; physical and other properties of textiles; standards; textiletesting										
	narrow	textiles, finis	shing, manufa	cture; te	xtile m	achine	s; sustai	nability in 1	the text	ile chain	
	narrow intellige	textiles, finis ent/functional	shing, manufa	cture; te cal and c	xtile mother p	achine: ropertie	s; sustai es of text	nability in 1	the text	ile chain	
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•	narrow intellige instrume Forms of Lecture,	textiles, finis ent/functional ents. Recenti	shing, manufa textiles; physi research topic eminar	cture; te cal and c	xtile mother p	achine: ropertie	s; sustai es of text	nability in 1	the text	ile chair	
4 5	narrow intellige instrume Forms of Lecture,	textiles, finisent/functional ents. Recentiteaching: teaching: , hands-on se	shing, manufa textiles; physi research topic eminar	cture; te cal and c	xtile mother p	achine: ropertie	s; sustai es of text	nability in 1	the text	ile chain	
5	narrow intellige instrume Forms of Lecture, Participat Formal: Content:	textiles, finisent/functional ents. Recenting teaching: , hands-on section requireme	shing, manufa textiles; physi research topic eminar	cture; te cal and c	xtile mother p	achine: ropertie	s; sustai es of text	nability in 1	the text	ile chair	
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Module coordinator:			
Prof. Dr. rer. pol. Hildegard Manz-Schumacher Other information:			