## Appendix A: Course Schedule

## for the study programme Optimisation and Simulation M.Sc.

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

Winter se	emester		L	ST	Е	P/S	SSS	СР
Module number	Module title	Module ID						
2015	Bionic Methods of Optimisation	BMO	2	0	2	0	0	6
2017	Project	PRO	0	0	0	2	0	6
2039	Risk Management	RIM	0	4	0	0	0	6
9023	Elective Module: Optimisation and Simulation	WM				0		6
9023	Elective Module: Optimisation and Simulation	WM				0		6
						Tota	I CP:	30
Summer	semester		L	ST	Ε	P/S	SSS	CP
Module number	Module title	Module ID						
2035	Discrete Optimisation	DOPT	2	2	0	0	0	6
2006	Management Skills	MMK	2	2	0	0	0	6
2013	Seminar	SE	0	0	0	4	0	6
9023	Elective Module: Optimisation and Simulation	WM				0		6
9023	Elective Module: Optimisation and Simulation	WM				0		6
						Tota	I CP:	30
Third ser	nester		L	ST	Ε	P/S	SSS	CP
Module number	Module title	Module ID						
2033	Colloquium	MKO	0	0	0	0	0	6
2034	Master Thesis	MA	0	0	0	0	0	24
						Tota	I CP:	30

Abbreviations of the teaching forms: L = lecture, ST = tuition in seminars, E = exercise, S = seminar, P = practical, SSS = supervised self-study (all data in semester credit hours); CP = credit points

W/S = winter/summer semester

Simulation									
Module number	Module title	Module ID	W/ S	L	ST	Е	P/S	SSS	СР
2014	Mechatronic Systems	MS	S	2	2	0	0	0	6
2011	Multi-Body Simulation	MKS	S	2	0	1	1	0	6
2010	Model-Based System Development	MSE	W	2	2	0	0	0	6

2012	Multidisciplinary Modelling With Modelica	MMM	S	2	0	2	0	0	6
2047	Multiphysics Simulation	MPH	W	2	0	2	0	0	6
2016	Simulation of Optical Systems	SOS	S	2	0	2	0	0	6
2009	System Simulation	SYS	S	2	2	0	0	0	6

## Appendix B: Module catalogue

for the study programme Optimisation and Simulation M.Sc.

Discrete Optimisation
Management Skills1Master Thesis2Mechatronic Systems2Multi-Body Simulation2Model-Based System Development2
Master Thesis
Mechatronic Systems2Multi-Body Simulation2Model-Based System Development2
Multi-Body Simulation
Model-Based System Development
Multidisciplinary Modelling With Modelica
Multiphysics Simulation
Project2
Risk Management
Seminar3
Simulation of Optical Systems
System Simulation
Elective Module: Optimisation and Simulation

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Bio	nic Method	s of Opt	imisation	1						ВМО	
Iden num	tification ber	Worklo	oad:	Credits:	Study	y semest	er:	Frequency offer	of the	Duratio	on:
201		180 h		6	1st seme	or ester	2nd	Annual (Winter)		1 sem	ester
1	Course:		P	lanned group s	izes	Scop	e	/	ontact time m teaching	Self-stu	dy
	Lecture		6	0 students		2	SCH	30	h	60	h
	Tuition in	n seminar		0 students		0	SCH	0	h	0	h
	Exercise		2	0 students		2	SCH	30	h	60	h
	Practical	or semina		5 students		0	SCH	0	h	0	h
	Supervise	ed self-stu	idy 6	0 students		0	SCH	0	h	0	h
3	algorithms. The students are able to assess for which problems bionic algorithms, algorithms, are suitable, as well as evaluate the quality of the optimisation results. It and model given problems in such a way that bionic algorithms become applicable use neural networks for modelling and increasing efficiency.										
	Classification of optimisation algorithms (heuristic, combinatorial, analytical, bionic). heuristic procedures: Random walk, hill climbing, simulated annealing, genetic algorit stochastic methods.  On genetic algorithms: Biological model, mathematical operators (selection, mutat theoretical background (schema theorem, building block hypothesis, speed of convergence Evolutionary strategies, differential evolution, particle swarming, ant algorithms, bee algorithms. Case studies, classic test functions (Rosenbrock saddle, Travelling Salesperson Implementation of a programming project.  Basics of artificial neural networks, the most important models, areas of application, es optimisation tasks.					algorithm , mutation ergence). ns, bee s sperson,	on, etc.)				
4	Forms of	_									
				vith project w	ork						
5	Participat Formal:	on requi	None								
	Content:		None								
6	Forms of	assessme									
~	Project v										
7			e award of	credit points:							
			tion pass	_							
8	Applicati	on of the	module (i	n the following				10			
0				nd Optimisati		Simula	non M.S	oc.			
9 Importance of the grade for the final grade:											
	accordin	g wik	T O								
10	Module (	•									
10	Module (	Officer:	riedrich	Biegler-König	<u>o</u>						
10		Officer: . math. F		Biegler-Köniş	g						

	<ul><li>Gerdes et. al, Evolutionäre Algorithmen</li><li>Script Neural Networks</li></ul>
12	Language:
	German

	crete Optim	isation							DOPT	
Iden	tification ber:	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duratio	on:
203	5	180 h	6	1st o	r 2nd s	em.	Annual (Summer	)	1 sem	ester
1	Course:		Planned group siz	zes	Scope	e	Actual c / classro teaching	ontact time om	Self-stu	dy
	Lecture		60 students		2	SCH	30	h	60	h
	Tuition in	seminars	30 students		2	SCH	30	h	60	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical or seminar		15 students		0	SCH	0	h	0	h
	Supervised self-study		60 students		0	SCH	0	h	0	h
	The students are familiar with different problem characteristics and the corresponding solution method of integer and combinatorial optimisation problems and are able to solve relevant real-world problem with the help of suitable models and methods of discrete optimisation.									
3	Contents:									
			sation problems							
	_	ack problems								
	_		ching problems	4						
		-	on and Chinese Po (machine allocat		-					
			packing problems		w proc	Juction)				
				,						
		- Facility & hub location problems								
4	Forms of teaching:									
4		teaching:	g with accompany	ying ex	ercise					
5	Seminar-	teaching:	g with accompany	ying ex	ercise					
	Seminar-	teaching: based teaching ion requirements None	g with accompany							
5	Seminar- Participati Formal: Content:	teaching: based teaching ion requirements None Basic	g with accompany			ion				
	Seminar- Participati Formal: Content: Forms of	teaching: based teaching ion requirements None Basic assessment:	g with accompany s: knowledge of lin	near opt	imisati					
5	Seminar- Participati Formal: Content: Forms of a	teaching: based teaching ion requirements None Basic assessment: per, written ex-	g with accompany s: knowledge of lin amination, combi	near opt	imisati examir		erformance	e examinat	ion, proje	ect work,
5	Seminar- Participati Formal: Content: Forms of a Term pap oral exam	teaching: based teaching ion requirements None Basic assessment: per, written examination or examination or examination	g with accompany s: knowledge of lin amination, combi	near opt	imisati examir		erformance	e examinat	ion, proje	ect work,
5	Seminar- Participati Formal: Content: Forms of a Term pap oral exan Prerequisi	teaching: based teaching ion requirements None Basic assessment: per, written examination or examite for the award	g with accompany s: knowledge of lin amination, combination during of credit points:	near opt	imisati examir		erformance	e examinat	ion, proje	ect work,
5 6	Seminar- Participati Formal: Content: Forms of a Term pap oral exan Prerequisi Module 6	based teaching based teaching non requirements None Basic assessment: ber, written examination or examination parents ber of the award examination parents	with accompany s: knowledge of lin amination, combi amination during of credit points: ass	near opt	imisati examir ırse	nation, p	erformance	e examinat	ion, proje	ect work,
6	Seminar- Participati Formal: Content: Forms of a Term pap oral exam Prerequisi Module e Application	based teaching based teaching non requirements None Basic assessment: ber, written examination or examination paon of the module	with accompany s: knowledge of lin amination, combination during of credit points: ass e (in the following s	near opt	imisati examir ırse	nation, p	erformance	e examinat	ion, proje	ect work,
5 6 7 8	Seminar- Participati Formal: Content: Forms of a Term pap oral exam Prerequisi Module 6 Application Optimisa	based teaching based teaching non requirements None Basic assessment: ber, written examination or examination paon of the module	with accompany s: knowledge of lin amination, combination during of credit points: ass e (in the following s	near opt	imisati examir ırse	nation, p	erformance	e examinat	ion, proje	ect work,
5 6	Seminar- Participati Formal: Content: Forms of a Term pap oral exam Prerequisi Module e Application Optimisa Importance	based teaching based teaching non requirements None Basic assessment: ber, written examination or examination paon of the module	with accompany s:  knowledge of lin amination, combination during of credit points: ass e (in the following s lation M.Sc.	near opt	imisati examir ırse	nation, p	erformance	e examinat	ion, proje	ect work,
5 6 7 8	Seminar- Participati Formal: Content: Forms of a Term pap oral exam Prerequisi Module e Application Optimisa Importance	based teaching: based teaching ion requirements None Basic assessment: ber, written examination or exacte for the award examination particular	with accompany s:  knowledge of lin amination, combination during of credit points: ass e (in the following s lation M.Sc.	near opt	imisati examir ırse	nation, p	erformance	e examinat	ion, proje	ect work,
5 6 7 8 9	Seminar- Participati Formal: Content: Forms of a Term pap oral exan Prerequisi Module of Application Optimisa Importance according Module O	based teaching: based teaching ion requirements None Basic assessment: ber, written examination or exacte for the award examination particular	knowledge of lin amination, combi amination during of credit points: ass e (in the following s lation M.Sc. or the final grade:	near opt	imisati examir ırse	nation, p	erformance	e examinat	ion, proje	ect work,
5 6 7 8 9	Seminar- Participati Formal: Content: Forms of a Term pap oral exan Prerequisi Module of Application Optimisa Importance according Module O	based teaching:  based teaching:  None  Basic  assessment:  ber, written examination or examination proof the module ation and Simules of the grade for the	knowledge of lin amination, combi amination during of credit points: ass e (in the following s lation M.Sc. or the final grade:	near opt	imisati examir ırse	nation, p	erformance	e examinat	ion, proje	ect work,
5 6 7 8 9	Seminar- Participati Formal: Content: Forms of a Term pap oral exam Prerequisi Module of Application Optimisa Importance according Module O Prof. Dr. Other info	based teaching based teaching non requirements None Basic assessment: ber, written examination or examination particle for the award examination particle of the grade for	knowledge of lin amination, combi amination during of credit points: ass e (in the following s lation M.Sc. or the final grade:	nation the cou	examir examir examir ogramn	nation, p			ion, proje	ect work,
5 6 7 8 9	Seminar- Participati Formal: Content: Forms of a Term pap oral exam Prerequisi Module of Application Optimisa Importance according Module O Prof. Dr. Other info	teaching:  based teaching ion requirements  None  Basic assessment:  per, written examination or examination or examination paragraph of the grade for the g	with accompany s:  knowledge of lin amination, combination during of credit points: ass e (in the following s lation M.Sc. or the final grade:  Ide unced at the begin	nation the cou	examir examir examir ogramn	nation, p			ion, proje	ect work

2011	oquium								МКО		
Ident numl	rification per:	Workload:	Credits:	Study	semest	ter:	Frequenc	ey of the	Duratio	on:	
2033	3	180 h	6	3rd s	emeste	er	each ser	nester			
1	Course:		Planned group siz	zes	Scop	e	Actual / classr teachin		Self-stud	ly	
	Lecture		60 students		0	SCH	0	h	180	h	
	Tuition in	seminars	30 students		0	SCH	0	h	0	h	
	Exercise		20 students		0	SCH	0	h	0	h	
	Practical of	or seminar	15 students		0	SCH	0	h	0	h	
	Supervised self-study 60 students				0	SCH	0	h	0	h	
	The colloquium complements the master thesis and is to be assessed independently. It serves to determine whether the candidate is capable of orally presenting and independently justifying the scientific topic of the master thesis, its subject-related foundations, its interdisciplinary connections and its non-subject-related references, as well as assessing its significance for practice.										
3	Contents:										
	- Co	ontent of the th	nesis according to	the tor	nic						
	<ul> <li>Content of the thesis according to the topic</li> <li>Disputation on the procedure in the preparation of the thesis and the questions that arose in the</li> </ul>										
	context of the thesis						nesis and	the question	s that aro	se in the	
4	Forms of	ntext of the th teaching:	esis			of the th	nesis and	the question	is that aro	se in the	
4	Forms of Oral exam	ntext of the th teaching: mination for th	he master thesis			of the th	nesis and	the question	as that aro	se in the	
5	Forms of to Oral examparticipati	ntext of the the teaching: mination for the ion requirement	esis he master thesis ts:			of the th	nesis and	the question	s that aro	se in the	
	Forms of Oral examparticipating Formal:	ntext of the the teaching: mination for the ton requirement None	he master thesis	ne prep	aration	of the th	nesis and	the question	as that aro	se in the	
5	Forms of Oral example Participating Formal:	ntext of the the teaching: mination for the teaching in the te	esis he master thesis ts:	ne prep	aration	of the th	nesis and	the question	s that aro	se in the	
	Forms of Oral example Participation Formal: Content: Forms of State Participation Part	ntext of the the teaching: mination for the teaching: mination for the teaching: None Treat assessment:	he master thesis	ne prep	aration	of the th	nesis and	the question	s that aro	se in the	
5	Forms of Oral example Participation Formal: Content: Forms of Oral example Oral example Participation Forms of State Participation F	ntext of the the teaching: mination for the teaching: mination for the teaching: None Treat assessment: mination	esis he master thesis ts: ement of the maste	ne prep	aration	of the th	nesis and	the question	as that aro	se in the	
5	Forms of Oral example Participation Formal: Content: Forms of Oral example Oral example Participation Forms of State Participation F	ntext of the the teaching: mination for the teaching: mination for the teaching: None Treat assessment: mination	he master thesis	ne prep	aration	of the th	nesis and	the question	as that aro	se in the	
5	Forms of oral example.  Participation Formal:  Content:  Forms of a oral example.  Oral example.	ntext of the the teaching: mination for the teaching: mination for the teaching: None Treat assessment: mination te for the award	esis he master thesis ts: ement of the maste	er thesi	aration		nesis and	the question	as that aro	se in the	
5 6 7	Forms of oral example of the contents of the contents of the contents or the content or the cont	ntext of the the teaching: mination for the teaching: mination for the teaching: mination for the teaching: None Treat assessment: mination te for the award on of the modul	he master thesis ts:  ment of the master d of credit points:	er thesi	aration s	nes)					
5 6 7 8	Forms of Oral examparticipation  Participation  Formal:  Content:  Forms of Solution  Oral examparticipation  Application  Electrical  M.Sc.	ntext of the the teaching: mination for the teaching: mination for the teaching: None None Treat assessment: mination te for the award on of the modul l Engineering	he master thesis ts:  ment of the master d of credit points: e (in the following some M.Eng., Mechanic	er thesi	aration s	nes)					
5 6 7	Forms of oral example of the content of the content oral example of the content or oral example of the content or oral example of the content or oral example or orange or or orange or	ntext of the the teaching: mination for the ton requirement None Treat assessment: mination te for the award on of the modul l Engineering te of the grade for	he master thesis ts:  ment of the master d of credit points: e (in the following s	er thesi	aration s	nes)					
5 6 7 8 9	Forms of oral example of the contents of the c	ntext of the the teaching: mination for the ton requirement None Treat assessment: mination te for the award on of the moduled Engineering te of the grade for the grade f	he master thesis ts:  ment of the master d of credit points: e (in the following some M.Eng., Mechanic	er thesi	aration s	nes)					
5 6 7 8	Forms of oral example of the content	ntext of the the teaching: mination for the interest of the the teaching: mination for the interest of the int	he master thesis ts:  ment of the master d of credit points: e (in the following and	er thesi	aration s	nes)					
5 6 7 8 9	Forms of oral example of the content	ntext of the the teaching: mination for the teaching: mination for the teaching: mination for the teaching: mination for the teaching teaching for the award for the modulate of the grade for the gra	he master thesis ts:  ment of the master d of credit points: e (in the following and	er thesi	aration s	nes)					
5 6 7 8 9	Forms of oral example of the content	ntext of the the teaching: mination for the teaching: mination for the teaching: mination for the teaching: None Treat assessment: mination te for the award on of the modul I Engineering te of the grade for the teaching to MRPO officer: -Ing. Jens Hatormation:	he master thesis ts:  ment of the master d of credit points: e (in the following s M.Eng., Mechanic for the final grade:	er thesi	s rogramm gineeri	nes) ng M.Sc					
5 6 7 8 9	Forms of oral example of the content	ntext of the the teaching: mination for the teaching: mination for the teaching: None Treat assessment: mination te for the award on of the modul I Engineering te of the grade for the grade for the teaching to MRPO officer: -Ing. Jens Haupmation: te will be annother the teaching to the	he master thesis ts:  ment of the master d of credit points: e (in the following and	er thesi	s rogramm gineeri	nes) ng M.Sc					

	nagement S	Skills							MMK		
Iden	tification ber:	Workload:	Credits:	Stud	y semest	er:	Frequency	y of the	Duratio	on:	
2000	6	180 h	6	1st seme	or ester	2nd	Annual Summer		1 sem.		
1	Course:		Planned group	sizes	Scope	e	/	contact time	Self-stuc	ly	
	<b>T</b> .		60 . 1		2	GGII		m teaching	<b>CO</b>	Τ.	
	Lecture		60 students 30 students		2	SCH SCH	30	h h	60	h	
	1 uition ii	n seminars	50 students		2	зсп	30	П	60	h	
	Exercise		20 students		0	SCH	0	h	0	h	
	Practical	or seminar	15 students		0	SCH	0	h	0	h	
	Superviso	ed self-study	60 students		0	SCH	0	h	0	h	
3	have learned to analyse entrepreneurial measures from different perspectives. They can evaluate own behaviour/perception more realistically. They can use methods to motivate employees themselves, to work successfully in a team and to react sensibly in case of conflict or crisis. The apply methods to deal sensibly with high task loads.  Contents:  Strategic corporate planning, motivational theories, leadership methods, values in management, sprofessional and methodological competence, general legal issues, occupational safety, environm protection, energy and resource efficiency, sustainable economic activities, code of German refere intercultural management, global development and production strategies, project management, management, target tracking and controlling, balanced score card, technology excellence level, chanagement, conflict management, stress and time management, communication in the event of a confidence of the confidenc					ate emplo	yees an				
						ronmenta eferences nent, self el, chang					
4		teaching:									
5				Lectures, case studies, exercises  Participation requirements:							
			Formal: None								
	Content: None										
6	Forms of	assessment:									
6		assessment:		minatio	n or ora	l examii	nation				
	Written Prerequis	assessment: examination, site for the awa	combination exa	minatio	1 or ora	l examii	nation				
7	Written Prerequis Module Application Electrica	assessment: examination, site for the awa examination on of the mod	combination exa	g study p	rogramn	nes)		misation ar	nd Simula	tion	
7 8	Written Prerequis Module Applicati Electrica M.Sc. Importan	assessment: examination, site for the awa examination on of the mod al Engineerin	combination exaurd of credit points: pass ule (in the following	g study p nical Er	rogramn	nes)		misation ar	nd Simula	tion	
7 8	Written Prerequis Module Applicati Electrica M.Sc. Importan accordir Module	assessment: examination, site for the awa examination on of the mod al Engineerin ce of the grade ng to MRPO Officer:	combination exaurd of credit points: pass ule (in the following M.Eng., Mecha	g study p nical Er	rogramn	nes)		misation ar	nd Simula	tion	
7 8 9	Written Prerequis Module Applicati Electrica M.Sc. Importan accordir Module ( Prof. Dr	assessment: examination, site for the awa examination on of the mod al Engineerin ce of the grade ng to MRPO	combination exaurd of credit points: pass ule (in the following M.Eng., Mecha	g study p nical Er	rogramn	nes)		misation ar	nd Simula	tion	
7 8	Written Prerequis Module Applicati Electrica M.Sc. Importan accordir Module ( Prof. Dr Other inf	assessment: examination, site for the awa examination on of the mod al Engineerin ce of the grade g to MRPO Officer:Ing. Bruno formation: re will be ann	combination exaurd of credit points: pass ule (in the following M.Eng., Mecha	g study p nical En	rogramn	nes) ng M.So		misation ar	nd Simula	tion	

Mas	ter Thesis								M.A.	
Iden num	tification ber:	Workload:	Credits:	Study	semest	er:	Frequenc	y of the	Duratio	on:
203	4	720 h	24	3rd s	emeste	r	each sen	nester	20 we	eks
1	Course:		Planned group s	izes	Scope	e	Actual / classro teaching		Self-study	
	Lecture		60 students		0	SCH	0	h	720	h
	Tuition in	seminars	30 students		0	SCH	0	h	0	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical or seminar		15 students		0	SCH	0	h	0	h
	Supervised self-study 60 studen				0	SCH	0	h	0	h
3	task from his/her subject area within a specified period of time, both in its subject-specific details are in the interdisciplinary contexts, working independently and according to scientific methods.  Contents:									
3	The mas program investiga	ster thesis is a me with a desc	an independent s cription and explanceptual or designole.	anation	of its so	olution. I	t can also	be determi	ned by an	empiric
4	Forms of	teaching:								
	Written	composition w	ith faculty tutori	ng						
5	Participat	ion requirement	ts:							
	Formal:	None	<b>;</b>							
	Content:		dinated topic from	m the st	udent's	special:	subject ar	ea		
6	Forms of	assessment:								
7	Prerequis	ite for the award	d of credit points:							
8			e (in the following M.Eng., Mechar				. and Opti	imisation a	nd Simula	tion
9		ce of the grade f	for the final grade:							
		g to MRPO								
10	Module C									
		-Ing. Jens Hau	ıbrock							
11	Other info		1 1 . 1		C 41					
	Literature will be announced at the beginning of the course.									
12	Language		unced at the beg	inning c	or the co	ourse.				

German

	hatronic S	ystems							MS	
Ident numl	ification	Workload:	Credits:	Study	semest	er:	Frequenc	y of the	Durati	on:
2014		180 h	6	1st seme	or ster	2nd	Annual (Summe	r)	1 sem	ester
1	Course:		Planned group s	sizes	Scop	e		contact time om teaching		
	Lecture		60 students		2	SCH	30	h	60	h
		n seminars	30 students		2	SCH	30	h	60	h
	ъ :		20 . 1 .		0	COLL	0	1	0	-
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		0	SCH	0	h	0	h
	Supervise study	ed self-	60 students		0	SCH	0	h	0	h
2		outcomes/com	petences:							
Students can apply standardised methods to describe the kinematics and dynamics of technical							cal			
3	systems.									
Kinematics of the point, the rigid and the solid body, the systems of rigid bodies in spatial measurement models of mechanisms, cardan joint, planetary gear, gyroscope  Synthetic mechanics: Axioms of Newton and Euler (impulse theorem, twist theorem) - Planetary motion, gyroscopic motion, stability of motion, force effect of unbalance dynamics of machine foundations, e.g. tower generators, model demonstrations  Kinematics in the relative system: - Proof of the earth's rotation with Foucault pendulum, free fall on rotating earth  Analytical mechanics, differential and integral principles: Principle of virtual work, d'Alembert's principle, Lagrange's liberation principle - Equilibrium, stability, equations of motion of mechanisms and elastic bodies  Hamilton's principle, Lagrange's equations: - Calculus of variations, Lagrange multipliers, crank drive, torsional vibrations in shaft line string and diaphragm vibrations										
4	Forms of	teaching:								
1		teaching: seminar-base	ed teaching							
	Lecture,									
	Lecture,	seminar-base	nts:							
	Lecture, Participat	seminar-base	nts: ie							
5	Lecture, Participat Formal: Content: Forms of	seminar-base ion requirement Non Non assessment:	nts: e e							
5	Lecture, Participat Formal: Content: Forms of Written	seminar-base ion requirement Non Non assessment: examination	nts: ue ue or oral examinatio	on						
5	Lecture, Participat Formal: Content: Forms of Written Prerequis	seminar-base ion requirement Non Non assessment: examination	or oral examination of credit points:	on						

	BioMechatronics M.Sc. and Optimisation and Simulation M.Sc.
9	Importance of the grade for the final grade:
	according to MRPO
10	Module Officer:
	Prof. DrIng. Heinrich Kühlert
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

IVIUI	i-Body Si	mulation							MKS	
Ident numb	ification per:	Workload:	Credits:	Study	semes	ter:	Frequenc	y of the	Duration:	
2011		180 h	6	1st seme	or	2nd	Annual (Summer)		1 semester	
1	Course:		Planned group	sizes	Scop	e		contact time om teaching	Self-stu	dy
	Lecture		60 students		2	SCH	30	h	60	h
		n seminars	30 students		0	SCH	0	h	0	h
				20 students			Ů			
	Exercise					SCH	15	h	30	h
	Practical or seminar		15 students		1 SCH			h	30	h
	Supervised self-study		60 students		0	SCH	0	h	0	h
2	Learning	outcomes/co	mnetences:							
	program	mes.	m, interpret simula	tion resu	Its and	compare	e them with	h the results	of MBS	sımulatı
3	Contents		1.							
			nition, examples)							
		pts in plane	is, generalised coo	rdinatas						
		ive condition		rumates						
			standardised descri	intion of	mecha	nisms				
			n of the kinematic		11100110					
	- Equati	ions of moti	on of dynamics un	der cons	traints					
		nge multipli								
		and control	elements							
		l systems								
		parameters	standardised descri	intion of	anatia	gratom	,			
4		teaching:	stanuaruiseu uesci	ipuon oi	spana	systems	·			
•		-	ning with exercises	and pra	ctical t	raining o	on the con	nputer		
5		tion requirem		F				-T		
	Formal:	No	one							
	Content:	No	one							
6		assessment:								
			n, combination exa	mınation	, perfo	rmance	examinati	on or oral ex	xaminati	on
7		examination	rard of credit points:							
8			dule (in the following	g study pr	ogramı	nes)				
			.Sc., Mechanical E		-		Optimisati	on and Simu	ılation M	I.Sc.
9	_	_	le for the final grade							
1.0		g to MRPO								
10	Module (		Joumann							
11	Other inf	Ing. Rolf Normation:	naumann							
11					C .1					
	Literanii	re Will he an	nounced at the beg	ոլրրոր բ	of the c	ourse L	iterature:			

	Haug, E.J.H: Computer-Aided Kinematics and Dynamics of Mechanical Systems, Volume 1. Basic Methods, Allyn And Bacon, ISBN 0-205-11669-8 (v.1) 1989.
12	Language:
	German

Mod	del-Based S	System Do	evelopm	ent						MSE	Duration:	
Iden num	tification ber:	Worklo	ad:	Credits:	Study	semest	er:	Frequency offer	of the	Duratio	on:	
201	0	180 h		6	1st seme	or ester	2nd	Annual (Winter)		1 seme	ester	
1	Course:		P	lanned group	sizes	Scope	e	Actual co	ontact time om	Self-stud	ly	
	Lecture		6	0 students		2	SCH	30	h	60	h	
	Tuition in	n seminars	3	0 students		2	SCH	30	h	60	h	
	Г :		2	20 students		0	CCII	0	1	0	1	
	Exercise					0	SCH SCH	0	h h	0	h h	
	Practical or seminar			15 students		U	зсп	U	11	U	11	
	Supervise	ed self-stud	dy 6	0 students		0	SCH	0	h	0	h	
	model-b	ased deve		evelopment j t and be able					ns and too		ıpling.	
3									ns and too		ipling.	
3	Contents	:	elopmen	t and be able					ns and too		ipling.	
3	Contents Model-b	: oased syst	em desig	t and be able	to use th	ne most	importa		ns and too		ipling.	
3	Contents Model-t Develop Signal a Element	: pased systement production	em desig cedure n ns theory ls, systen	t and be able	opment s:	method	ology	ency domai	n methods	s, system	ipling.	
3	Contents Model-b Develop Signal a Element descripti Systems systems	: pased systement produced systemetry signalition methods and methods filter designation for the system of the sys	em designed in the cedure in the cry ls, system ods, continued in the cont	gn: nodels, devel supplements n properties,	opment s: time do view/dis sing: Sig	method main ar crete-tin	ology ad frequence view cessing	ency domai , z-transfor chain, signa	n methods mation, st	s, system ability		
3	Contents Model-b Develop Signal a Element descripti Systems systems Filters, f special r Aspects arithmet	end system tary signal ion methors and methors filter design methods of realisa	em designed as theory ls, systemods, continuods of sign, biling	gn: nodels, devel supplements n properties, inuous-time ignal process ear transform	opment s: time do view/dis sing: Sig ation, di	method main ar crete-tin nal prod	ology ad frequence view cessing ters (dir	ency domai , z-transfor chain, signa	n methods mation, st	s, system ability		
3	Contents Model-to Develop  Signal a Element descripti  Systems systems, Filters, f special r  Aspects arithmet Architec	end system and system tary signal ion methods and methods of realisatic, scaling ctures	em designed and selopment of se	gn: nodels, devel supplements n properties, inuous-time ignal process ear transform	opment s: time do view/dis sing: Sig ation, di	method main ar crete-tin nal proc gital fil	ology ad frequence view cessing ters (dir	ency domai , z-transfor chain, signa	n methods mation, st	s, system ability		
	Contents Model-to Develop Signal a Element descripti Systems systems, Filters, f special r Aspects arithmet Architec HW/SW	eased systement production methods of realisatic, scaling ctures are teaching:	em designed and the cedure in the continuous of seconds of seconds of seconds and generation and generation and centation and ce	gn: nodels, devel supplements n properties, inuous-time ignal process ear transform implementat ethods Application 6	opment s: time do view/dis sing: Sig ation, di	method main ar crete-tin nal prod gital fil	ology ad frequencessing ters (directly)	ency domai , z-transfor chain, signa rect constru	n methods mation, st	s, system ability		
4	Contents Model-to Develop  Signal a Element descripti  Systems systems, Filters, f special r  Aspects arithmet Architec HW/SW	eased systement production methods of realisatic, scaling ctures teaching: teaching:	em designed and the cedure of seconds of sec	gn: nodels, devel supplements n properties, inuous-time ignal process ear transform implementat ethods	opment s: time do view/dis sing: Sig ation, di	method main ar crete-tin nal prod gital fil	ology ad frequencessing ters (directly)	ency domai , z-transfor chain, signa rect constru	n methods mation, st	s, system ability		
3 4 5	Contents Model-to Develop  Signal a Element descripti  Systems systems, Filters, f special r  Aspects arithmet Architec HW/SW	eased systement production methods and methods and methods of realisatic, scaling etures iting implements teaching: -based teation require	em designed and the cedure of seconds of sec	gn: nodels, devel supplements n properties, inuous-time ignal process ear transform implementat ethods Application 6	opment s: time do view/dis sing: Sig ation, di	method main ar crete-tin nal prod gital fil	ology ad frequencessing ters (directly)	ency domai , z-transfor chain, signa rect constru	n methods mation, st	s, system ability		

6	Forms of assessment:
	Written examination, combination examination, performance 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)
	BioMechatronics M.Sc. and Optimisation and Simulation M.Sc.
9	Importance of the grade for the final grade:
	according to MRPO
10	Module Officer:
	Prof. DrIng. Joachim Waßmuth
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

Mult	idisciplina	ry Modellin	ng With Modelica						MMN	1
Ident numb	ification er:	Workload:	Credits:	Study	y semes	ter:	Frequenc offer	y of the	Durati	on:
2012	,	180 h	6	1st seme	or 2nd ester		Annual (Summer)		1 semester	
1	Course:		Planned group s	d group sizes		e	/	contact time	Self-study	
	Lecture		60 students		2	SCH	30	h	60	h
	Tuition in	seminars	30 students		0	SCH	0	h	0	h
	Exercise		20 students		2	SCH	30	h	60	h
	Practical of	or seminar	15 students		0	SCH	0	h	0	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
3	simulatio	n. In partic	d the basic chara ular, they are able guage Modelica.	to devel	op and	simulat	e their ow	n physical i	models o	n the ba
3										
		uous systen								
		and energy		hladr d		~				
			s generalisation of oraic Equations (DA		iagraiii	S				
		eneration f	-	AL)						
	_		d structurally varial	ble syste	ems					
		nd state eve	•	ore syste	71115					
			of many switching	g elemer	nts					
		onisation o		6						
		al application								
4	Forms of	teaching:								
	Seminar-	based teach	ning with exercises	and pra	cticals					
5	Participati	on requirem								
	Formal:	No								
	Content:	No	one							
6		assessment:					C			
			examination, com			nation, p	erforman	ce examinat	ion, proj	ect work
7			examination during ard of credit points:		urse					
/		examination	_							
8			dule (in the following	g study n	rooramr	nes)				
,			Sc. and Optimisat				Sc.			
9			le for the final grade:							
	_	g to MRPO	-							
10	Module O									
	Prof. Dr.	phil. Bernh	nard Bachmann							
11	Other info	_								
			nounced at the beg	ginning o	of the c	ourse.				
12	Language	:								
	German									

	tiphysics S	Simulation							MPH	
Iden	tification ber:	Workload:	Credits:	Study	semest	er:	Frequenc offer	y of the	Duratio	on:
204	7	180 h	6	1st seme	or ester	2nd	Annual (Winter)		1 seme	ester
1	Course:		Planned group s	sizes	Scope	e	Actual / classro teaching		Self-stuc	ly
	Lecture		60 students		2	SCH	30	h	60	h
	Tuition in	n seminars	30 students		0	SCH	0	h	0	h
	Exercise		20 students		2	SCH	30	h	60	h
	Practical	or seminar	15 students		0	SCH	0	h	0	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
3	- Trinn - N - B bo - M	reatment of ty teraction, etc. umerical solut est practice in oundary condi	ultiphysics via copical couplings ( ) and their application methods (especial modelling (CAL tions, developments imulation using mples	e.g. electrations in pecially of for sime ent of solutions.	tro-then praction FEM) nulation lution s	rmal WV ce , approp trategie	W, fluid-th oriate discr s, etc.)	ermal WW		
4 5	Lecture, Participa	tion requiremen		xercises	on the	compute	er			
	Lecture,	seminar-style	ts:	xercises	on the	compute	er —			
5	Lecture, Participa Formal: Content: Forms of	seminar-style tion requiremen None None assessment:	ts:	xercises	on the	compute	er			
5	Participa Formal: Content: Forms of	seminar-style tion requiremen None None assessment: work	ts: e	xercises	on the o	compute	er —			
5	Participa Formal: Content: Forms of Project of Prerequise	seminar-style tion requiremen None None assessment: work site for the awar	ts: e e d of credit points:	xercises	on the	compute	er			
5 6 7	Lecture, Participa Formal: Content: Forms of Project of Prerequise Module	seminar-style tion requiremen None None assessment: work site for the awar examination p	ts: e e d of credit points:				er			
5 6 7	Lecture, Participa Formal: Content: Forms of Project v Prerequis Module Applicati	seminar-style tion requiremen None None assessment: work site for the awar examination p tion of the modu	ts: e e d of credit points: bass	g study pi	rogramn	nes)				
5 6 7 8	Lecture, Participa Formal: Content: Forms of Project of Prerequis Module Application Mechan Importan	seminar-style tion requiremen None None assessment: work site for the awar examination p ion of the modu ical Engineeri ce of the grade	ts: e e d of credit points: bass le (in the following	g study pi timisatio	rogramn	nes)				
5 6 7 8	Lecture, Participa Formal: Content: Forms of Project of Prerequise Module Applicati Mechan Importan accordir	None  Sassessment:  work  site for the awar  examination p  ion of the modu  ical Engineeri ce of the grade  ng to MRPO	ts: e d of credit points: bass le (in the following ng M.Sc. and Op	g study pi timisatio	rogramn	nes)				
5 6 7 8	Lecture, Participa Formal: Content: Forms of Project of Prerequise Module Application Mechan Important accordin	None None Sassessment: work site for the awar examination properties of the grade ing to MRPO Officer:	ts: e e d of credit points: bass le (in the following ng M.Sc. and Op for the final grade:	g study pi timisatio	rogramn	nes)				
5 6 7 8 9	Lecture, Participa Formal: Content: Forms of Project of Prerequise Module Application Mechan Important accordine Module of Prof. Dr	seminar-style tion requiremen None None assessment: work site for the awar examination p ton of the modu ical Engineeri ce of the grade ng to MRPO Officer: rer. nat. Lars	ts: e e d of credit points: bass le (in the following ng M.Sc. and Op for the final grade:	g study pi timisatio	rogramn	nes)				
5 6 7 8	Lecture, Participa Formal: Content: Forms of Project v Prerequis Module Applicati Mechan Importan accordir Module 0 Prof. Dr Other inf	seminar-style tion requiremen None None assessment: work site for the awar examination properties of the grade ical Engineering to MRPO Officer: rer. nat. Lars formation:	ts: e  d of credit points: bass le (in the following ng M.Sc. and Op for the final grade:	g study pi timisatio	rogramn on and	nes) Simulat				
5 6 7 8 9	Lecture, Participa Formal: Content: Forms of Project v Prerequis Module Applicati Mechan Importan accordir Module 0 Prof. Dr Other inf	seminar-style tion requiremen None None Sassessment: work site for the awar examination p ion of the modu ical Engineeri ice of the grade ing to MRPO Officer: rer. nat. Lars formation: re will be annoted	ts: e e d of credit points: bass le (in the following ng M.Sc. and Op for the final grade:	g study pi timisatio	rogramn on and	nes) Simulat				

Proj	ect								PRO	
Ident	tification ber:	Workload:	Credits:	Study	semest	er:	Frequence offer	cy of the	Durati	ion:
2017	7	180 h	6 1st seme		or ester	2nd	Annual (Winter	)	1 sem	nester
1	Course:		Planned group sizes		Scop	e		contact classroom	Self-stu	ıdy
	Lecture		60 students		0	SCH	0	h	0	h
	Tuition in	seminars	30 students		0	SCH	0	h	0	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		2	SCH	30	h	150	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
3	Contents:  - W - Ap - Do Forms of Project in	ork processes		t plans	ving str		ng and co	omprehensi	ve produ	ct through
5	Formal:	None								
	Content:	None								
6		assessment:	<del>-</del>							
U			combination exa	mination	nerfo	rmance	examinat	ion or oral	examinati	ion
7	Prerequis		d of credit points:		, perio	iniunice	-Aummut	ion of oral	Crummut.	1011
0		1	e (in the following	r atudy n	ooroma	205)				
8		tion and Simu	-	study pr	ograniii	108)				
9			for the final grade:							
,	_	g to MRPO	and muli grade.							
10	Module C									
-	Prof. Dr.	-Ing. Rolf Na	umann							
11	Other info									
	Literatur	e will be anno	ounced at the beg	ginning o	of the c	ourse.				
12	Language	:								
	German									

Risk	Managem	ent							RIM	
dent	ification	Workload:	Credits:	Study	semest	er:	Frequency	y of the	Duratio	on:
2039		180 h	6	1st seme	or ster	2nd	Annual (Winter)		1 semester	
	Course:		Planned group s	sizes	Scop	e	Actual of / classro teaching		Self-stud	dy
	Lecture		60 students	dents		SCH	0	h	0	h
	Tuition in	seminars	30 students		4	SCH	60	h	120	h
	Exercise		20 students	) students		SCH	0	h	0	h
	Practical	or seminar	r seminar 15 students		0	SCH		h	0	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
	Learning	outcomes/comp	petences:		ļ	1				
			sic approaches for ly it in practice	or (especi	ially fi	nancial)	risk mana	gement in c	ompanie	s and
	- Ri - Oı - Te - M - Ri - Ri - IT	sk types. Risk rganisation of echniques for athematical m sk aggregatio sk manageme support for risk manageme	utional framework classification risk managementrisk identification modelling of risks and assessment strategies and isk management. Int as a building less of risk manage	nt. Risk n n t techniqu esp. sim block for	ies iulation optim	n of oper	rational pr	ain in comp		S
	Forms of	teaching:								
	Tuition i	n seminars								
5	Participat	ion requiremen	ts:							
	Formal:	None	-							
	Content:	None	e							
i		assessment:				- 41-				
			oral exam or examor or examination of credit points:	m accom	ıpanyır	ig the co	ourse			
	•	examination p	•							
			le (in the following	g study pr	ogramn	nes)				
	~ ~	ation and Sim		,	D	/				
	Importano	ce of the grade	for the final grade:							
.0	Module C	g to MRPO								
U		rer. nat. Clau	dia Cottin							
1	Other info		dia Cottiii							
-	Literatur short scr	re will be annoting the same and current	ounced at the beg at professional are Cottin, S. Doeh	ticles). L	iteratu	re source	e for math	ematical as <sub>l</sub>		

	Spektrum 2013.	
12	Language:	Ī
	German	

Sem	inar									SE	
Iden	tification ber:	Workloa	ıd:	Credits:	Study	semest	er:	Frequence offer	ey of the	Durati	on:
2013	3	180 h		6 1st sen		or ester	2nd	each ser	mester	1 sem	nester
1	Course:			Planned group sizes		Scope	2)	Actual / classr teachin		Self-stu	ıdy
	Lecture Tuition in seminars		6	0 students		0 S		0	h	0	h
			3	30 students		0	SCH	0	h	0	h
	Exercise		2	0 students		0	SCH	0	h	0	h
	Practical of	or seminar	1	5 students		4	SCH	60	h	120	h
	Supervise	d self-stud	ly 6	60 students		0	SCH	0	h	0	h
	Students a given to	have dev	eloped the fiel	nces: their skills i ld of optimiz							
3	Students a given to	have dev opic from orox. one-	eloped the fiel	their skills i ld of optimiz							
3	Students a given to in an app	have devopic from	veloped the fiel hour lea	their skills i ld of optimiz	zation and	simula	tion, su	mmarisin			
3	Students a given to in an app  Contents: Selected Forms of	have devopic from orox. one-topics on teaching:	veloped the fiel hour led	their skills i ld of optimiz cture	eation and	simula (partly	in Engl	mmarisin			
4	Students a given to in an app  Contents: Selected Forms of Independent	have devopic from prox. one-topics on teaching:	veloped the field thour led to optimize the optimizer optimizer the opti	their skills i ld of optimiz cture	eation and	simula (partly	in Engl	mmarisin			
	Students a given to in an app  Contents: Selected Forms of Independent	have devopic from prox. one-topics on teaching: lent elaborion require	reloped the fiel hour lead optimistion a perments:	their skills i ld of optimiz cture	eation and	simula (partly	in Engl	mmarisin			
4	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal:	topics on teaching:	reloped a the fiel hour lead optimist o	their skills i ld of optimiz cture	eation and	simula (partly	in Engl	mmarisin			
5	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content:	topics on teaching: lent elaborion require	reloped a the fiel hour led a optimis oration a ements: None None	their skills i ld of optimiz cture	eation and	simula (partly	in Engl	mmarisin			
4	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of	topics on teaching: lent elaborion require lassessmen	reloped a the fiel thour led optimismoration a continuity or the continuity of the c	their skills i ld of optimiz cture	eation and	simula (partly	in Engl	mmarisin			
5	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of	topics on teaching: lent elaborion require assessmen examinati	reloped a the fiel thour led optimismoration a continuity oration accomments:  None None tt:	their skills i ld of optimiz cture sation and si	eation and	simula (partly	in Engl	mmarisin			
5	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of Prerequisi	topics on teaching: lent elaborion require assessment examination for the second secon	reloped a the fiel thour leads optimized optim	their skills i ld of optimiz cture  sation and si and presenta	eation and	simula (partly	in Engl	mmarisin			
5	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of Prerequisi Module of	topics on teaching: lent elaborion require assessmen examinatiite for the rexaminati	reloped a the fiel thour led a optimized oration a community oration a community oration accommendation award of the field on passion passion passion are related to the field of the field of the field or the field	their skills i ld of optimiz cture  sation and si and presenta	mulation tion of a g	(partly	in Engl	mmarisin			
<ul><li>4</li><li>5</li><li>6</li><li>7</li></ul>	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of Prerequisi Module of Application	topics on teaching: lent elaborion require examinati ite for the a examination of the n	reloped a the fiel hour led a optimist oration a coments:  None None at: ion award of ion pass module (i	their skills i ld of optimiz cture  sation and si and presenta	mulation tion of a g	(partly	in Engl	mmarisin			
<ul><li>4</li><li>5</li><li>6</li><li>7</li></ul>	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of Prerequisi Module of Application Optimisa Important	topics on teaching: lent elaborion require assessment examination of the nation and tee of the grant forms.	oration a continuismonth of the field of the	their skills i ld of optimiz cture  sation and si and presenta  credit points in the followin	ention and amulation tion of a g	(partly	in Engl	mmarisin			
4 4 5 5 6 6 7 7 8 9 9	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of Prerequisi Module of Application Optimisa Importance according	topics on teaching: lent elaborion require assessmen examination of the nation and the of the gray growth matter than the control of the gray growth matter than the growth matter than the control of the gray growth matter than the growth matter than the gray gray gray gray gray gray gray gray	oration a continuismonth of the field of the	their skills i ld of optimiz cture  sation and si and presenta  credit points n the followin ion M.Sc.	ention and amulation tion of a g	(partly	in Engl	mmarisin			
4 5 6 7 8	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of Prerequisi Module of Application Optimisa Importance according	topics on teaching: lent elaborion require assessment examination of the nation and tee of the gray to MRP Officer:	reloped a the fiel thour led to optimize the optimized optimization optimized optimized optimized optimized optimized optimize	their skills i ld of optimiz cture  sation and si and presenta  credit points n the followin ion M.Sc. the final grade	ention and amulation tion of a g	(partly	in Engl	mmarisin			
4 5 7 8 9	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of Prerequisi Module of Application Optimisa Importance according Module of Prof. Dr.	topics on teaching: lent elaborion require assessmen examination of the nation and ce of the graph to MRP Officer: phil. Ber	reloped a the fiel thour led to optimize the optimized optimization optimized optimized optimized optimized optimized optimize	their skills i ld of optimiz cture  sation and si and presenta  credit points n the followin ion M.Sc.	ention and amulation tion of a g	(partly	in Engl	mmarisin			
4 5 5 6 6 7 8 9	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of Prerequisi Module of Application Optimisa Importance according Module of Prof. Dr. Other info	topics on teaching: lent elaborion require assessmen examination of the nation and ce of the graph to MRP Officer: phil. Ber	reloped a the fiel thour led to optimise oration a coments:  None None award of ion pass module (i Simulaterade for the CO company of the	their skills in the following ion M.Sc. the final grade	ention and amulation tion of a g	(partly given to	in Engl	mmarisin			
4 5 7 8 9	Students a given to in an app  Contents: Selected Forms of Independ Participati Formal: Content: Forms of In-class of Prerequisi Module of Application Optimisa Importance according Module of Prof. Dr. Other info	topics on teaching: lent elaborion require examination of the nation and te of the graphil. Ber primation: e will be	reloped a the fiel thour led to optimise oration a coments:  None None award of ion pass module (i Simulaterade for the CO company of the	their skills i ld of optimiz cture  sation and si and presenta  credit points n the followin ion M.Sc. the final grade	ention and amulation tion of a g	(partly given to	in Engl	mmarisin			

Sim	ulation of	Optical Syster	ns						SOS		
Iden	tification ber:	Workload:	Credits:	Study	semes	ter:	Frequency	y of the	Duratio	on:	
2010		180 h	6	1st seme	or	2nd	Annual (Summer	r)	1 seme	ester	
1	Course:		Planned group s	sizes	Scop	e	Actual of / classro teaching		Self-stud	Self-study	
	Lecture		60 students		2	SCH	30	h	60	h	
	Tuition in	n seminars	30 students		0	SCH	0	h	0	h	
	Exercise		20 students		2	SCH	30	h	60	h	
	Practical	or seminar	15 students		0	SCH	0	h	0	h	
	Supervised self-study		60 students		0	SCH	0	h	0	h	
	optical interacti	systems. Apping light-gene	ration of selected ly typical optics rating and light- n areas of optical	and indirecting	age pr	rocessing	g libraries	. Name, in	terpret a	nd desig	
3	selected principle imaging	l areas of geon optical systems, spectral ser systems of	netrical optics and ems, Industrial un sitivity, optical s sensor technolog gn and simulation	use of o sensors a gy, two-	optical nd mea	systems asuremei	s. Camera nt technolo	concepts:	Interface device te	es, senso chnology	
3	Selected selected principle imaging principle	l areas of geon optical syste es, spectral ser systems of es, optics design	ems, Industrial unsitivity, optical sensor technology and simulation	use of conservations of the servation of	optical nd mea and t	systems asuremei	s. Camera nt technolo	concepts:	Interface device te	es, senso chnology	
4	Selected selected principle imaging principle  Forms of Seminar	l areas of geon optical syste es, spectral ser systems of ses, optics design re-based teaching:	ems, Industrial unsitivity, optical sensor technology and simulation and simulation are with accompan	use of conservations of the servation of	optical nd mea and t	systems asuremei	s. Camera nt technolo	concepts:	Interface device te	es, senso chnology	
4	Selected selected principle imaging principle Forms of Seminar Participa	l areas of geon optical syste es, spectral ser systems of es, optics desig  reaching: -based teaching tion requirement	ems, Industrial unsitivity, optical sensor technology and simulation and simulation are with accompants:	use of conservations of the servation of	optical nd mea and t	systems asuremei	s. Camera nt technolo	concepts:	Interface device te	es, senso chnology	
4	Selected selected principle imaging principle  Forms of Seminar Participa  Formal:	l areas of geon optical syste es, spectral ser systems of ses, optics design re-based teaching:	ems, Industrial unsitivity, optical sensor technology and simulation and with accompants:	use of conservations of the servation of	optical nd mea and t	systems asuremei	s. Camera nt technolo	concepts:	Interface device te	es, senso chnology	
4 5	Selected selected principle imaging principle Forms of Seminar Participa Formal:	l areas of geon optical syste es, spectral ser systems of es, optics design  reaching: rebased teaching None	ems, Industrial unsitivity, optical sensor technology and simulation and with accompants:	use of conservations of the servation of	optical nd mea and t	systems asuremei	s. Camera nt technolo	concepts:	Interface device te	es, senso chnology	
4 5	Selected selected principle imaging principle Forms of Seminar Participa Formal:  Content: Forms of	l areas of geon optical syste es, spectral ser systems of ses, optics design  re-based teaching hone None assessment:	ems, Industrial unsitivity, optical sensor technology and simulation and simulation are with accompanits:	use of censors a gy, two- n.	optical nd mea and t	systems asuremen hree-din	s. Camera nt technolo nensional	concepts: ogy, optical data acquis	Interface device te sition, ill	es, senso chnology uminatio	
4 5 6	Selected selected principle imaging principle Forms of Seminar Participa Formal: Content: Forms of Written Prerequise	l areas of geon optical syste es, spectral ser systems of es, optics design  leaching: -based teaching tion requiremen None assessment: examination, site for the awar	ems, Industrial unsitivity, optical sensor technology and simulation and with accompanits:  e e combination example of credit points:	use of censors a gy, two- n.	optical nd mea and t	systems asuremen hree-din	s. Camera nt technolo nensional	concepts: ogy, optical data acquis	Interface device te sition, ill	es, senso chnology uminatio	
4	Selected selected principle imaging principle Forms of Seminar Participa Formal: Content: Forms of Written Prerequis Module	l areas of geon optical syste es, spectral ser systems of es, optics design  leaching: -based teaching tion requirement None assessment: examination, site for the awar examination p	ems, Industrial unsitivity, optical sensor technology and simulation and with accompanits:  e e combination example of credit points:	nying ex	ercise	systems asurement hree-din	s. Camera nt technolo nensional	concepts: ogy, optical data acquis	Interface device te sition, ill	es, senso chnology uminatio	
4 5 6	Selected selected principle imaging principle imaging principle Forms of Seminar Participa Formal: Content: Forms of Written Prerequis Module Applicati	l areas of geon optical syste es, spectral ser systems of es, optics design  leaching: -based teaching tion requirement None assessment: examination, site for the awar examination p	ems, Industrial unsitivity, optical sensor technology and simulation and simulation are with accompanits:  e  e  combination example of credit points:  bass  le (in the following)	nying ex	ercise	systems asurement hree-din	s. Camera nt technolo nensional	concepts: ogy, optical data acquis	Interface device te sition, ill	es, senso chnology uminatio	
5 6 7	Forms of Seminar Participa Formal: Content: Forms of Written Prerequis Module Application Optimis Important	l areas of geon optical syste es, spectral ser systems of ses, optics designed respond to the systems of ses, optics designed	ems, Industrial unsitivity, optical sensor technology and simulation and simulation are with accompanits:  e  e  combination example of credit points:  bass  le (in the following)	nying ex	ercise	systems asurement hree-din	s. Camera nt technolo nensional	concepts: ogy, optical data acquis	Interface device te sition, ill	es, senso chnology uminatio	
4 5 7 8	Forms of Seminar Participa Formal: Content: Forms of Written Prerequis Module Applicati Optimis Importan accordir	l areas of geon optical syste es, spectral ser systems of ses, optics designed respond to the systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of systems of ses, optics designed to the systems of syst	ems, Industrial unsitivity, optical sensor technology and simulation and simulation are with accompanits:  e  e  combination example of credit points:  bass  le (in the following ulation M.Sc.	nying ex	ercise	systems asurement hree-din	s. Camera nt technolo nensional	concepts: ogy, optical data acquis	Interface device te sition, ill	es, senso echnolog uminatio	
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4 5 6 7 8 9	Selected selected principle imaging principle imaging principle Forms of Seminar Participa Formal: Content: Forms of Written Prerequis Module Application Optimis Important according Module Optimis Optimis Important according Prof. Dr	areas of geon optical systes, spectral sers, spectral sers, systems of ses, optics designates, optics design	ems, Industrial unsitivity, optical sensor technology and simulation and simulation are with accompanitis:  e  e  combination example of credit points:  bass le (in the following ulation M.Sc. for the final grade:	nying ex	ercise	systems asuremen hree-dim	s. Camera nt technolo nensional	concepts: ogy, optical data acquis	Interface device te sition, ill	es, sens echnolog uminatio	

	em Simula	tion								SYS	
Ident	tification ber:	Worklo	ad:	Credits:	Study	semest	er:	Frequency offer	of the	Duration	1:
2009		180 h		6	1st seme	or ster	2nd	Annual (Summer)		1 semes	ster
1	Course:	ı	Pl	anned group s	sizes	Scope	e	Actual c / classro teaching		Self-study	y
	Lecture		60	) students		2	SCH	30 h		60	h
	Tuition in	n seminars	30	) students		2	SCH	30	h	60	h
	Exercise		20	20 students 15 students		0	SCH	0	h	0	h
	Practical	or semina	r 15			0	SCH	0	h	0	h
	Supervised self-stud		dy 60	) students		0	SCH	0	h	0	h
	system s	imulators y them o	s, such as ut in a ta	now how to Matlab/Sim rgeted manne cal simulation	ulink. Th er. Furth	ey can	also pla , they a	an simulation re able to a	on experim ssess the o	ents syste pportuniti	maticall
3	- M te - M tr - Si - Si	odelling chniques lodel prepeatment of mulation	methods experimentation for algebra procedure	tions, types of (balance-spatental modell for simulation tic loops and tres (classifications) tents (planning)	nce based ing) n (transfe structura ation, sel	, formater to standard singu	alisms fonte represolations, criteria,	esentation, descriptor num. prob	ectri. syst., block diagr form) blems)		
4		teaching:	ton.com	nin one							
5		tion requir	1	IIIIIais							
5	Formal:		None								
			None								
6	Forms of Term pa	assessmer per, writt	en exami	ination, comb			nation, p	erformance	e examinat	ion, projec	ct work,
6 7	Forms of Term pa oral exam Prerequis	assessment per, writt mination ite for the	nt: en exami or exami award of	ination, comb nation during credit points:			nation, p	erformance	e examinati	ion, projec	ct work,
7	Forms of Term pa oral exam Prerequis Module Applicati	assessmer per, writt mination ite for the examinat on of the 1	nt: en exami or exami award of ion pass nodule (ir	nation during	g the cou	rse ogramn	nes)				
7	Forms of Term pa oral exam Prerequis Module Applicati BioMecl	assessmen per, writt mination ite for the examinat on of the n hatronics	en exami or exami award of ion pass module (ir M.Sc., N	nation during credit points:	g the cou	rse ogramn	nes)				
	Forms of Term pa oral exai Prerequis Module Applicati BioMeci Importan accordin Module (	assessment per, writt mination ite for the examination of the phatronics ce of the gray to MRI Officer:	en exami or exami award of ion pass module (ir M.Sc., M	nation during credit points: a the following Mechanical E me final grade:	g the cou	rse ogramn	nes)				
7 8 9	Forms of Term pa oral exam Prerequis Module Applicati BioMeci Importan accordin Module ( Prof. Dr Other inf	assessment per, written mination ite for the examination of the nation of the phatronics are of the gray to MRI Officer: Ing. Kla ormation:	en exami or exami award of ion pass module (ir M.Sc., M	nation during credit points: a the following Mechanical E me final grade:	g the cou	ogramn ng M.S	nes)				

Elective Module: Optimisation and Simulation									WM		
Identification number:		Workload:	Credits:	Study	Study semester:		Frequency of the offer		Duration:		
9023		180 h	6	1st seme	1st or 2nd semester		each semester		1 semester		
1	Course:		Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study		
	Lecture		60 students			SCH		h		h	
	Tuition in seminars		30 students			SCH		h		h	
	Exercise		20 students			SCH		h		h	
	Practical or seminar		15 students		0	SCH	0	h	0	h	
	Supervised self-study		60 students			SCH		h		h	
2	Learning outcomes/competences:										
3	Contents:										
4	Forms of teaching:										
5	Participation requirements:										
	Formal:										
	Content:										
6	Forms of assessment:										
7	Prerequis	Prerequisite for the award of credit points:									
8	~ ~	Application of the module (in the following study programmes)									
9		Optimisation and Simulation M.Sc.  Importance of the grade for the final grade:									
10	Module Officer:  Prof. Dr. Ing. Bolf Neumann										
11		Prof. DrIng. Rolf Naumann Other information:									
12	Language	2:									
	German										