Appendix A: Course Schedule

for the study programme Electrical Engineering B.Eng.

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

Specialisation: Energy and Drive Technology

First sen	nester		L	ST	Е	P/S	SSS	СР
Module number	Module title	Module ID						
1018	Occupational Fields of Electrical Engineers	BER	2	1	0	0	0	4
1071	Electrical Engineering 1	ET1	2	1	0	1	0	5
1104	Computer Science 1	INF1	2	1	0	1	0	5
1146	Mathematics 1	MA1	4	2	0	0	0	8
1195	Physics 1	PH1	2	1	0	1	0	5
1279	Materials in Electrical Engineering and Electronics	WE	2	1	0	1	0	5
					1	Tota		32
Second s	semester		L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1066	Electronics 1	EL1	2	1	0	1	0	5
1075	Electrical Engineering 2	ET2	2	1	0	1	0	5
1108	Computer Science 2	INF2	2	1	0	1	0	5
1152	Mathematics 2	MA2	4	2	0	0	0	8
1200	Physics 2	PH2	2	1	0	1	0	5
						Tota	I CP:	28
Third ser			L	ST	E	P/S	SSS	CP
Module	Module title	Module						
number		ID						
1315	Automation Technology	AT	2	1	0	1	0	5
1024	Business Administration	BW	3	1	0	0	0	5
1059	Electrical Machines	EM	2	1	0	1	0	5
1068	Electronics 2	EL2	2	1	0	1	0	5
1169	Metrology	MT	2	1	0	1	0	5
1085	Technical English 1	FSE1	0	4	0	0	0	5
						Tota	I CP:	30
Fourth s	emester		L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1013	Power Drive Technology	ATR	2	1	0	1	0	5
1051	Introduction to Electrical Power Engineering	EN	3	1	0	0	0	5
1318	Numerics for Electrical Engineers	NFE	2	1	0	1	0	5
	Automatic Control Engineering	RT	2	1	0	1	0	5
1235	Automatic Control Engineering							
	Sensors	SEN	2	1	0	1	0	5
1235			2	1	0	1	0	5

Fifth sem	nester		L	ST	Е	P/S	SSS	СР
Module number	Module title	Module ID						
1057	Power Generation and Distribution 1	EV1	2	1	0	1	0	5
1138	Power Electronics	LE	2	1	0	1	0	5
<mark>1078</mark>	Electric Traction	ETR	2	1	0	1	0	5
1254	Student Research Project	STA	0	0	0	2	0	5
9022	Elective Module: Energy and Drive Technology	WM				0		5
<mark>1283</mark>	Wind and Hydropower	WWK	2	2	0	0	0	5
						Total	CP:	30
Sixth ser	nester		L	ST	Ε	P/S	SSS	CP
Module number	Module title	Module ID						
1011	Drive Systems	ATS	2	1	0	1	0	5
1058	Power Generation and Distribution 2	EV2	3	1	0	0	0	5
<mark>1193</mark>	Photovoltaics Photovoltaics	PHV	2	1	0	1	0	5
1217	Project	PR	0	0	0	2	0	5
9022	Elective Module: Energy and Drive Technology	WM				0		5
9022	Elective Module: Energy and Drive Technology	WM				0		5
						Total	CP:	30
Seventh	semester		L	ST	Ε	P/S	SSS	СР
Module number	Module title	Module ID						
1291	Bachelor Thesis	BA	0	0	0	0	0	12
1290	Colloquium	KOL	0	0	0	0	0	3
1292	Practical Project / Internship	PRA	0	0	0	0	0	15
					•	Total	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

The practical project can optionally be replaced by a semester abroad.

Elective N	Elective Modules Energy and Drive Technology								
Module number	Module title	Module ID	W/ S	L	ST	Е	P/S	SSS	СР
1010	Plant Design	APL	S	2	1	1	0	0	5
1042	Decentralised Energy Systems	DEZ	W	2	1	0	1	0	5
1056	Energy Storage Devices and Fuel Cells	EEB	W	2	1	0	1	0	5
3135	Gender and Diversity: Success Factors for Companies	GUD	W	2	2	0	0	0	5
1166	Measuring and Testing Systems	MPS	S	2	1	0	1	0	5
1173	Microcontrollers	MC	W	2	1	0	1	0	5

1244	Simulation Technology	SIM	W	2	1	0	1	0	5
1401	High-Voltage Technology	HST	W	<mark>2</mark>	0	1	1	O	<mark>5</mark>
1086	Technical English 2	FSE2	S	0	4	0	0	0	5
1266	Thermal Use of Renewable Energies	TNE	S	2	1	0	1	0	5
1267	Thermodynamics 1	TD1	S	2	2	0	0	0	5

EDUTech									
Module	Module title	Module	W/	L	ST	Ε	P/S	SSS	СР
number		ID	S						
1303	General Didactics and Orientation	EDU/A	W	0	2	0	0	0	5
	Practical	D							
1306	Vocational Education I and	BP1	W	0	2	0	0	0	5
	Vocational Field Practical								
1307	Vocational Education II	EDU/BP	S	0	4	0	0	0	5
		2							
1304	Diagnosis and Support	EDU/D	S	0	4	0	0	0	5
		UF							
1312	Didactics of Technology	EDU/T	S	0	4	0	0	0	5
		D							

Four of the five EduTech modules can be integrated into the course of study. They then replace elective modules. The fifth module is considered an additional performance.

Appendix B: Course Schedule

for the study programme Electrical Engineering B.Eng.

Specialisation: Electronics and Automation Technology

First sem	nester		L	ST	E	P/S	SSS	СР
Module	Module title	Module						
number		ID						
1018	Occupational Fields of Electrical	BER	2	1	0	0	0	4
	Engineers							
1071	Electrical Engineering 1	ET1	2	1	0	1	0	5
1104	Computer Science 1	INF1	2	1	0	1	0	5
1146	Mathematics 1	MA1	4	2	0	0	0	8
1195	Physics 1	PH1	2	1	0	1	0	5
1279	Materials in Electrical Engineering	WE	2	1	0	1	0	5
	and Electronics							
					•	Tota	I CP:	32
Second s	semester		L	ST	E	P/S	SSS	СР
Module	Module title	Module						
number		ID						
1066	Electronics 1	EL1	2	1	0	1	0	5
1075	Electrical Engineering 2	ET2	2	1	0	1	0	5
1108	Computer Science 2	INF2	2	1	0	1	0	5
1152	Mathematics 2	MA2	4	2	0	0	0	8
1200	Physics 2	PH2	2	1	0	1	0	5
	, ,		l .	1	1	Tota	I CP:	28
Third ser	mester		L	ST	E	P/S	SSS	СР
Module	Module title	Module	1		-	., .		.
number		ID						
1315	Automation Technology	AT	2	1	0	1	0	5
1024	Business Administration	BW	3	1	0	0	0	5
1059	Electrical Machines	EM	2	1	0	1	0	5
1068	Electronics 2	EL2	2	1	0	1	0	5
1169	Metrology	MT	2	1	0	1	0	5
1085	Technical English 1	FSE1	0	4	0	0	0	5
	3		1	II	1	Tota	I CP:	30
Fourth se	emester		L	ST	E	P/S	SSS	СР
Module	Module title	Module	1		-	., .		0.
number		ID						
1013	Power Drive Technology	ATR	2	1	0	1	0	5
1051	Introduction to Electrical Power	EN	3	1	0	0	0	5
	Engineering			-				
1318	Numerics for Electrical Engineers	NFE	2	1	0	1	0	5
1235	Automatic Control Engineering	RT	2	1	0	1	0	5
1242	Sensors	SEN	2	1	0	1	0	5
1121	Signals and Systems	SigSys	2	1	0	1	0	5
	<u> </u>	1 - 3 - 3 -	1				I CP:	30
Fifth sen	nester		L	ST	E	P/S	SSS	CP
Module	Module title	Module			_	', 0		0.
number	modalo titlo	ID						
1101	High-Frequency Electronics	HFE	2	1	0	1	0	5
	19 1.04401103 210011011103	1		1		1 .		Ŭ

1138	Power Electronics	LE	2	1	0	1	0	5
1190	Optoelectronics	OPT	2	1	0	1	0	5
1254	Student Research Project	STA	0	0	0	2	0	5
9021	Elective Module: Electronics and	WM				0		5
	Automation Technology							
1287	State Space Control	ZRG	2	1	0	1	0	5
						Tota	I CP:	30
Sixth sen	nester		L	ST	Е	P/S	SSS	СР
Module	Module title	Module						
number		ID						
1062	Electromagnetic Compatibility	EMC	2	1	0	1	0	5
1079	Embedded Systems	ESYS	2	1	0	1	0	5
1174	Microsystems Technology	MST	2	0	0	2	0	5
1217	Project	PR	0	0	0	2	0	5
9021	Elective Module: Electronics and	WM				0		5
	Automation Technology							
9021	Elective Module: Electronics and	WM				0		5
	Automation Technology							
						Tota	I CP:	30
Seventh	semester		L	ST	E	P/S	SSS	CP
Module	Module title	Module						
number		ID						
1291	Bachelor Thesis	BA	0	0	0	0	0	12
1290	Colloquium	KOL	0	0	0	0	0	3
1292	Practical Project / Internship	PRA	0	0	0	0	0	15
						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

The practical project can optionally be replaced by a semester abroad.

Elective	Modules Electronics and Automat	ion Techno	ology						
Module number	Module title	Module ID	W/ S	L	ST	Е	P/S	SSS	СР
1029	Machine Vision	BIL	W	2	1	0	1	0	5
3135	Gender and Diversity: Success Factors for Companies	GUD	W	2	2	0	0	0	5
1311	Intelligent Sensor Systems	ISS	S	2	1	0	1	0	5
1164	Mechatronics	ME	S	2	1	0	1	0	5
1166	Measuring and Testing Systems	MPS	S	2	1	0	1	0	5
1173	Microcontrollers	MC	W	2	1	0	1	0	5
1180	Networks and Bus Systems	NBS	W	2	2	0	0	0	5
1181	Network Technology	NW	W	2	1	0	1	0	5
1231	Computer Architectures	RA	W	2	1	0	1	0	5
1240	Robotics	ROB	W	2	1	0	1	0	5

1244	Simulation Technology	SIM	W	2	1	0	1	0	5
<mark>1401</mark>	High-Voltage Technology	HST	W	<mark>2</mark>	O	1	1	0	<mark>5</mark>
1086	Technical English 2	FSE2	S	0	4	0	0	0	5

EDUTech									
Module number	Module title	Module ID	W/ S	L	ST	Е	P/S	SSS	СР
1303	General Didactics and Orientation Practical	EDU/A D	W	0	2	0	0	0	5
1306	Vocational Education I and Vocational Field Practical	BP1	W	0	2	0	0	0	5
1307	Vocational Education II	EDU/BP 2	S	0	4	0	0	0	5
1304	Diagnosis and Support	EDU/D UF	S	0	4	0	0	0	5
1312	Didactics of Technology	EDU/T D	S	0	4	0	0	0	5

Four of the five EduTech modules can be integrated into the course of study. They then replace elective modules. The fifth module is considered an additional performance.

Appendix C: Module catalogue

for the study programme Electrical Engineering B.Eng.

General Didactics Orientation Practical	22
Plant Design	24
Drive Systems	25
Power Drive Technology	27
Automation Technology	29
Bachelor Thesis	30
Vocational Education I and Vocational Field Practical	31
Vocational Education II	33
Business Administration	35
Machine Vision	37
Occupational Fields of Electrical Engineers	38
Decentralised Energy Systems	40
Diagnosis and Support	41
Introduction to Electrical Power Engineering	43
Power Generation and Distribution 1	44
Power Generation and Distribution 2	45
Energy Storage Devices and Fuel Cells	46
Electrical Machines	47
Electromagnetic Compatibility	50
Electronics 1	51
Electronics 2	53
Electrical Engineering 1	55
Electrical Engineering 2	56
Electric Traction	57
Embedded Systems	59
Gender and Diversity: Success Factors for Companies	61
High-Frequency Electronics	63
Computer Science 1	65
Computer Science 2	67
Intelligent Sensor Systems	69

Colloquium	71
Power Electronics	72
Mathematics 1	74
Mathematics 2	76
Mechatronics	78
Measuring and Testing Systems	80
Metrology	81
Microcontrollers	82
Microsystems Technology	84
Networks and Bus Systems	85
Network Technology	86
Numerics for Electrical Engineers	88
Optoelectronics	90
Photovoltaic Systems	92
Physics 1	94
Physics 2	96
Practical Project / Internship	98
Project	99
Computer Architectures	100
Automatic Control Engineering	102
Robotics	103
Sensors	105
Signals and Systems	107
Simulation Technology	109
Student Research Project	111
Didactics of Technology	112
Technical English 1	114
Technical English 2	116
Thermal Use of Renewable Energies	118
Thermodynamics 1	120
Elective Module: Electronics and Automation Technology	122
Elective Module: Energy and Drive Technology	123
Materials in Electrical Engineering and Electronics	124
Wind Turbines	125

State	Space	Control	 27	
State	Space	Connor	 	

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1 1 1 S	Course: Lecture Tuition in Exercise Practical Supervise Learning The stud - un ne fu - arv sig - ha	or seminar ed self-study outcomes/compents derstand didatighbouring dinctions of did e able to distinguificance of	actics as a sub-di isciplines and rel	sizes sizes sizes sizes selected foundation	Scop 0 2 0 0 0 0 of educeiplines didactions for	SCH SCH SCH SCH SCH SCH scation and a sas well a	teaching 0 30 0 80 0	contact lassroom g h h h h to draw f tify subje	ct areas an o highlight earning pro	h h h h h h h h h h h care to d
1 G	Lecture Tuition in Exercise Practical Supervise Learning The stud - un ne fu - arv sig - ha	or seminar od self-study outcomes/compents derstand dida ighbouring di nctions of did e able to distinguificance of	Planned group 60 students 30 students 20 students 15 students 60 students entics as a sub-disciplines and relactics. Inguish between sthese theoretical owledge and unconsidered to the second of the	sizes scipline lated disconselected foundations and derstanding the scipling scipli	Scop 0 2 0 0 0 0 of educeiplines didactions for	SCH SCH SCH SCH SCH SCH scation and sas well a	Actual time / c teaching 0 30 80 0	contact lassroom g h h h h h to draw f tify subje	Self-stu 0 30 0 10 0 curther bout ct areas and to highlight earning pro	h h h h h h h h h chartes to d
1 1 1 5	Lecture Tuition in Exercise Practical Supervise Learning The stud - un ne fu - arv sig - ha	or seminar ed self-study outcomes/compents derstand didatighbouring dinctions of did e able to distinguificance of	60 students 30 students 20 students 15 students 60 students ctics as a sub-disciplines and relactics. In the set heoretical owledge and uncompleted to the set of th	scipline lated disc	0 0 0 0 0 0 of educiplines didactions for any of c	SCH SCH SCH SCH SCH SCH scation and sas well a	time / c teaching 0 30 0 80 0	lassroom g h h h h h to draw f tify subje dels and to eaching-le	0 30 0 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	h h h h h h can be a considered as the consesses.
1 I S	Tuition in Exercise Practical Supervise Learning The stud - un ne fu - are sig - ha	or seminar ed self-study outcomes/compents derstand didatighbouring dinctions of did e able to distinguificance of	30 students 20 students 15 students 60 students etics as a sub-disciplines and relactics. Inguish between sthese theoretical owledge and unconsidered to the second students.	lated disconsisted selected foundations	2 0 0 0 of educciplines didactions for	SCH SCH SCH SCH SCH cation and as as well a	0 30 0 80 0 d are able as to iden	h h h h to draw f tify subje	30 0 10 0 further bout ct areas and to highlight earning pro-	h h h h h andaries to
1 I S	Exercise Practical Supervise Learning The stud - un ne fu - arr sig - ha	or seminar ed self-study outcomes/compents derstand didatighbouring dinctions of did e able to distinguificance of	20 students 15 students 60 students etics as a sub-disciplines and relactics. nguish between sthese theoretical	lated disconsisted selected foundation	of educeiplines didactions for any of c	SCH SCH SCH scation and a sas well a	d are able as to iden	h h h to draw f tify subjected and to eaching-leading-	0 10 0 curther bou ct areas and be highlight earning pro-	h h h h h h h h h h h h h h h h h h h
2 1	Practical Supervise Learning The stud - un ne fu - are sig - ha	outcomes/compents derstand didatighbouring diductions of	15 students 60 students petences: actics as a sub-disciplines and relactics. nguish between sthese theoretical	lated disconsisted selected foundation	of educeiplines didactions for any of c	SCH SCH scation and a sas well a	d are able as to iden	h h to draw f tify subjected and to eaching-leading-le	10 0 Curther bou ct areas an o highlight earning pro	h h h ndaries to d
2 I	Supervise Learning The stud - un ne fu - arv sig - ha	outcomes/compents derstand didatighbouring diductions of	60 students petences: actics as a sub-disciplines and relactics. nguish between sthese theoretical	lated disconsisted selected foundation	of educiplines didactions for any of c	scation and s as well a	d are able as to iden	to draw f tify subje	0 Curther bou ct areas and o highlight earning pro	ndaries to
2 I	Learning The stud - un ne fu - are sig - ha	outcomes/compents Iderstand didatighbouring dinctions of didetermined able to distinguish the control of the c	petences: actics as a sub-disciplines and relactics. actics. actics as a sub-disciplines and relactics.	lated disconsisted selected foundation	of educeiplines didactions for any of c	cation and s as well a c theories r the plan	d are able as to iden	to draw f tify subje dels and to eaching-le	Further bou ct areas an o highlight earning pro	ndaries to
	The stud - un ne fu - are sig - ha	ents Iderstand didating didations of didetermine able to distinguishing the distinguishing a basic knows a basic	actics as a sub-di isciplines and rel lactics. nguish between s these theoretical	lated disconsisted selected foundation	ciplines didactions for	s as well a	as to iden s and mod	tify subje dels and to eaching-le	ct areas an o highlight earning pro	the ocesses.
	The stud - un ne fu - are sig - ha	ents Iderstand didating didations of didetermine able to distinguishing the distinguishing a basic knows a basic	actics as a sub-di isciplines and rel lactics. nguish between s these theoretical	lated disconsisted selected foundation	ciplines didactions for	s as well a	as to iden s and mod	tify subje dels and to eaching-le	ct areas an o highlight earning pro	the ocesses.
	ne fu - ard sig - ha	ighbouring di nctions of did e able to disting gnificance of ve a basic kno	isciplines and rel lactics. nguish between s these theoretical owledge and und	lated disconsisted selected foundation	ciplines didactions for	s as well a	as to iden s and mod	tify subje dels and to eaching-le	ct areas an o highlight earning pro	the ocesses.
	- ard in - ard qu	the orientation the able to critical estions and to flect on their of	sfer the steps of lon practical interceally question the systematically own development theoretical disc	nship. is knowled elaborate the control of the con	anning edge, to e them	o modify during th	them for t the result the orientat	their own ting quest tion practi	ions in expical interns	oloratory ship.
3	di	enesis, subject dactics dactic theorie enstructivist d	t areas/fields of a es, e.g. didactics idactics, didactic lanning logic of	of educa es of educa teaching	itional t	theory, le	earning/te ys	eaching th		
	- St	ructure and plasic forms of	uidactic lesson p							
4 I	- St - Ba	asic forms of	uidactic lesson p							

5	Participation requi	irements:						
	Formal:							
	Content:							
6	Forms of assessment:							
	Oral examination							
7	Prerequisite for th	e award of credit points:						
	Module examina	ation pass and course assessment						
8	Application of the	module (in the following study programmes)						
	Electrical Engin	eering B.Eng. and Mechanical Engineering B.Eng.						
9	Importance of the	grade for the final grade:						
	according to BR	PO						
10	Module coordinate	or:						
	Prof. DrIng. Th	norsten Jungmann						
11	Other information							
12	Language:							
	German							

Plar	nt Design								APL		
	ntification lber:	Workload:	Credits:	Study	semest	er:	Frequenc offer	y of the	Duration: 1 semester		
101	0	150 h	5	4th seme	or ester	6th	Annual (Summe	r)			
1	Course:		Planned group s	sizes	Scope	e	Actual / classro teaching		Self-study		
	Lecture		60 students		2	SCH	30	h	45	h	
	Tuition in	seminars	30 students		1	SCH	15	h	22	h	
	Exercise		20 students		1	SCH	15	h	23	h	
	Practical	or seminar	15 students		0	SCH	0	h	0	h	
	Supervised self-study		60 students		0	SCH	0	h	0	h	
	a plannii	ng task in low the structurin	etion of the mod voltage and me g of the planning	edium/hi	gh volt	tage and	l to critica	lly question	the solu	ition. Thi	
3	production systems	tic approach ton plants using and electrical	o plant planning g the example of energy generation construction an	of bioga on syste	s plant ms, est	ts. Plani pecially	ning and pregenerati	projecting over energy g	of electrio generatio	cal energ n system	
4	Forms of	teaching:									
	Lecture a	and seminar									
5	Participat	ion requirement	s:								
	Formal:	None	;								
	Content:	None	;								
6		assessment: examination o	r oral examination	on							
7	Prerequis	ite for the award	of credit points:		nt						
8	Application Electrical	on of the modul	e (in the following B.Eng., Renewa	g study pr	ogramn		nd Industri	al Engineer	ing and		
9	Importan		or the final grade:								
10		oordinator:									
10		-Ing. Jens Hai	ıbrock								
11	Other info		-010 C R								
	Literatur	e will be anno	unced at the beg udy programme,	_			gy Efficie	nt Systems:	Elective	subject	
12	Language	::									
	German										

Driv	ve Systems									ATS	
Iden num	tification ber:	Workloa	d:	Credits:	Study	y semest	er:	Frequency offer	y of the	Duratio	on:
101	1	150 h		5	6th s	semeste	r	Annual (Summer)		1 seme	ester
1	Course:		Pl	anned group s	sizes	Scope	e	Actual of / classro teaching		Self-study	
	Lecture		60) students		2	SCH	30	h	45	h
	Tuition in	n seminars) students		1	SCH	15	h	22.5	h
	Exercise		20) students		0	SCH	0	h	0	h
	Practical	or seminar	15	students		1	SCH	15	h	22.5	h
	Supervise	ed self-stud	y 60) students		0	SCH	0	h	0	h
3	- to co	assess and ontrol rang understan dvantageou design ob fety applice learn about primum ru lodel-based ensorless de pace vecto ledd-oriente lethods of eticals: -quadrant age-freque	d select e d metho asly in d eserver-c cations ut uncor un-up, re d drive of r represe ed contr fuzzy co	ule will be quelectric four- ods of moder rive practice oriented continuentional management of the three ontrols in the control and the control and the control of the three with 4Q clutrol of the three of a 4Q frequention of the three of a 4Q frequention of the three of a 4Q frequential of the three of three of the three of three of the three of th	rn control rol methods s ration, for the state s vers replance-phase eir appli	and theories of the orientation	es in the sensorl fuzzy co drant op me don sors) ems ironous n drives	estate spaces low-coontrol eration, main) machine	ce and applyost automati	y them on and re	
4	Forms of Lecture,	_	ased tea	aching and la	aborator	y exerci	ses in s	mall group	os (3–4 parti	icipants)	
5		tion require									
	Formal:		Vone								
	Content:			Electrical Mould be suc				Systems (1013) and P	ower Ele	ctronic
6		assessment									
				al examination	on						
7	module	examinatio	on pass	credit points: and course a							
8	Applicati	on of the m	odule (ir	the following			nes)				
		al Enginee									
9	_			ne final grade:							
	according to BRPO Module coordinator:										
10	MICHIE	COMMINION									

11	Other information:
	Literature will be announced at the beginning of the course. Students must have sufficient knowledge and experience in the use and safety of electrical equipment.
12	Language: German

Pow	er Drive T	echnolog	gy							ATR	
dent	ification per:	Worklo	oad:	Credits:	Study	y semest	er:	Frequency	y of the	Duratio	on:
1013		150 h		5	4th seme	or	6th	Annual (Summer)		1 seme	ester
[Course:		P	lanned group	sizes	Scope)	Actual of / classro teaching		Self-stud	ly
	Lecture		6	0 students		2	SCH	30	h	45	h
	Tuition in	seminar	s 30	0 students		1	SCH	15	h	22.5	h
	Exercise	Exercise 20 students 0 SCH 0 h							0	h	
								15	h	22.5	h
								0	h		
,	Learning	outcome	s/competer	nces:				_			
	Students										
			y select co technolog	onverter-fed	drives fo	or any p	ractical	applicatio	n and descr	ibe them	in term
				sy nal controller	narame	ters of s	cascad	e structure	in the freq	uency do	main
			-	cal realisation	-				-	-	
		igital)	ne teenin	car rearisatio	n with o	реганог	iai amp	irrers (and	nogue) or n	петосон	ioners
3 Contents:											
	- M	echanica	al and dyı	namic require	ements o	n the sl	naft (fou	r-quadran	t operation)		
			-	d dimensioni				-	. ,		
	- Se	election	of suitable	e machine - o	converte	r combi	nations				
				ue cascade s	tructure	and its	control-	technical o	description	(Laplace	
		ansform)									
				e controller j					equency cha	ıracteristi	cs in th
		_		heir analogu							
	- F1	elds of a	ipplication	n of electrica	il drive to	echnolo	gy				
4	Forms of	_									
	Lecture,	seminar	-based te	aching and la	aborator	y exerci	ses in si	nall group	os (3–4 parti	cipants)	
5	Participat	ion requi									
	Formal:		None	T1	3.6.1:	(105	0) 1 1			11	1 . 1
	Content:		Module	on Electrical	Machin	es (105	9) shou	ld have be	en successf	ully com	pleted
6	Forms of										
				al examination	on						
7				credit points:	ecocomo	nt					
8				and course and the following			nes)				
,	~ ~			Eng. and Ren		_		; .			
)	Importan	ce of the	grade for t	he final grade:							
	accordin										
10	Module c			II. C							
11	Prof. Dr.		bil. Klaus	Hoter							
11				and at the bac		£41					
			a annound								
	Students	must ha	e annound ave suffic	ced at the beg ient knowled	ginning o lge and e	experier	ourse. ice in th	e use and	safety of ele	ectrical e	quipme

	Study programme Renewable Energies, specialisation Energy Generation Systems: Elective subject	
12	Language:	Ī
	German	

	omation Te	Workload	l: Credits:	Stud	y semest	ter:	Frequenc	y of the	Duratio	on:
num 131	ber: 5	150 h	5	3rd	semeste	r	offer Annual (Winter)		1 sem	ester
1	Course:		Planned group	sizes	Scop	e	Actual / classre teachin		Self-study	
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical or seminar		15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
	continuo design a	ous and val	the basic difference ue-discrete signals entation of discrete- te-event systems are	. Buildin -event co	ng on the	e funda	mentals o	f systems th	neory, ski	lls for th
	 Basic concepts of automation technology and systems theory Description of discrete-event systems by deterministic and non-deterministic autonomous automata, standard automata, in/output automatons and Petri nets. Behaviour of deterministic and non-deterministic autonomous automata, standard automata, input/output automata and Petri nets. Heuristic control design and implementation of the control law by means of application list (AWL) and step chains. Systematic design of discrete-event controllers based on a model of the control path Observation and diagnosis of discrete-event systems 							omata,		
4	Forms of	teaching:								
			npanying seminar e	xercises	and pra	cticals				
5	Participation Formal:	tion requirer	nents:							
	Content:	N	one							
6		assessment:								
			on; each with prelim		aminat	ion				
7			ward of credit points:							
0			on pass with prelimited							
8			ring B.Eng. and Rer				r			
9			ide for the final grade		Lineigic	ع السام م	,•			
	_	g to BRPC								
10		coordinator:								
	Prof. Dr	Ing. Dirk	Weidemann							
	Prof. DrIng. Dirk Weidemann Other information:									
11			nnounced at the be	ginning	of the c	ourse.				
11		re will be a	nnounced at the be	ginning	of the c	ourse.				

_ 2011	elor Thesi	s								BA	
Identi numb	ification	Worklo	oad:	Credits:	Study	semest	er:	Frequency	of the	Duratio	on:
1291		360 h		12	6th seme	or	7th	each sem	ester	12 weeks	
1	Course:		F	Planned group s	sizes	Scope	Actual contact time / classroom teaching			Self-stuc	ly
	Lecture 60 students 0 SCH 0 h 360 h										
	Tuition in seminars			0 students		0	SCH	0	h	0	h
	Exercise		2	0 students		0	SCH	0	h	0	h
	Practical of	or semina	ar 1	5 students		0	SCH	0	h	0	h
	Supervise	d self-stu	ıdy 6	0 students		0	SCH	0	h	0	h
	With the bachelor thesis, each candidate demonstrates that he/she is able to complete a practice-oriented task from his/her subject area within a specified period of time, both in its subject-specific details and in the interdisciplinary contexts, working independently and according to scientific methods.										
3		elor the gy task.	It should	ally an indep I deal with the er.							
4	Forms of	teaching			Forms of teaching:						
5	Participat	ion roqui									
	Formal	Participation requirements:									
	Content:	ion requi	None	ated topic fro	om the st	udent's	special	subject are	ea		
6			None Coordin	ated topic fro	om the st	udent's	special	subject are	ea		
6	Content: Forms of	assessme	None Coordin	ated topic fro	om the st	udent's	special	subject are	ea		
	Content: Forms of Prerequisi Application Apparati B.Eng, M. Industria	assessme on of the ve Biote Mechanical Engine	None Coordin ent: e award of module (i echnolog cal Engin eering an	r the following B.Sc., Elect teering B.Engd Managemen	g study pr trical Eng g., Mecha nt B.Sc.	ogramn	nes)	g., Engine	ering Comp		
7	Content: Forms of Prerequisi Application Apparati B.Eng, M. Industria Importance	assessme on of the ve Biote Mechanical Engine see of the	None Coordin ent: e award of module (i echnology cal Engin eering an grade for	r the following B.Sc., Elect	g study pr trical Eng g., Mecha nt B.Sc.	ogramn	nes)	g., Engine	ering Comp		
7 8	Content: Forms of Prerequisi Application Apparati B.Eng, M. Industria Important according Module co	assessme on of the on of the Mechanical I Engine g to BR oordinate	None Coordin ent: e award of module (i echnology cal Engin eering an grade for PO or:	recredit points: In the following B.Sc., Elect Ideering B.Eng d Management the final grade:	g study pr trical Eng g., Mecha nt B.Sc.	ogramn	nes)	g., Engine	ering Comp		
7 8	Content: Forms of Prerequisi Application Apparati B.Eng, M. Industria Importance according Module con Prof. Dr. Other info	assessment the for the condition of the version of the dechange of the ground to a sound the coordinate of the coordinat	None Coordin ent: e award of module (i echnology cal Engin grade for PO or: nton Klar	recredit points: n the following y B.Sc., Elect leering B.Eng d Management the final grade:	g study pr trical Eng g., Mecha nt B.Sc.	ogramn gineerii atronics	nes) ng B.En B.Sc.,	g., Engine	ering Comp		
7 8 9 10	Content: Forms of Prerequisi Application Apparati B.Eng, M. Industria Importance according Module con Prof. Dr. Other info	assessment to the control of the verbid to the control of the verbid to the control of the contr	None Coordin ent: e award of module (i echnology cal Engin grade for PO or: nton Klar	recredit points: In the following B.Sc., Elect Ideering B.Eng d Management the final grade:	g study pr trical Eng g., Mecha nt B.Sc.	ogramn gineerii atronics	nes) ng B.En B.Sc.,	g., Engine	ering Comp		

Lecture 60 students 0 SCH 0 h 0 h 0 h Tuition in seminars 30 students 2 SCH 30 h 30 h 30 h Exercise 20 students 0 SCH 80 h 10 h Practical or seminar 15 students 0 SCH 80 h 10 h Supervised self-study 60 students 0 SCH 80 h 10 h Supervised self-study 60 students 0 SCH 80 h 0 h 0 h Supervised self-study 60 students 0 SCH 80 h 0 h 0 h Learning outcomes/competences: Students: - understand vocational education as a sub-discipline of educational science, are able to distingue the respective subject areas and research fields from each other and explain them in context. - systematically reflect on exemplary practical experiences in the workplace and thereby a examine motives for their own career path. - are able to identify requirements for company and school educators and in this context understavocational education as a profession. - can describe the structures, forms and interfaces of the vocational education and training syste in Germany in a differentiated manner and consider the historical, educational policy and leg framework conditions. - use tools of scientific work competently. Contents: - Concepts, subject areas and research fields of educational science and vocational education a sub-discipline of educational science, - Objectives, structures and interfaces of the Vocational Educational Training (VET) system, leg framework of VET, - Contributors and roles in the VET system, - Processes of (vocational) pedagogical professionalisation - Software tools: Word processing programme, literature management programme - Methods of scientific work: Research, source work, text production 4 Forms of teaching: Tuition in seminars 5 Participation requirements: Formal: Content: Oral examination 7 Prerequisite for the award of credit points: Module examination pass and course assessment Oral examination		ational Edi	ucation I and '	Vocational Field	Practical	l				BP1	
Course:			Workload:	Credits:	Study	semes	ter:		y of the	Durati	on:
Lecture 60 students 0 SCH 0 h 0 h 0 h Tuition in seminars 30 students 2 SCH 30 h 30 h Exercise 20 students 0 SCH 0 h 0 h Practical or seminar 15 students 0 SCH 80 h 10 h Supervised self-study 60 students 0 SCH 80 h 10 h Supervised self-study 60 students 0 SCH 0 h 0 h 0 h Supervised self-study 60 students 0 SCH 0 h 0 h 0 h Learning outcomes/competences: Students: - understand vocational education as a sub-discipline of educational science, are able to distingue the respective subject areas and research fields from each other and explain them in context. - systematically reflect on exemplary practical experiences in the workplace and thereby a examine motives for their own career path. - are able to identify requirements for company and school educators and in this context understave vocational education as a profession. - can describe the structures, forms and interfaces of the vocational education and training syste in Germany in a differentiated manner and consider the historical, educational policy and leg framework conditions. - use tools of scientific work competently. Contents: - Concepts, subject areas and research fields of educational science and vocational education as sub-discipline of educational science, - Objectives, structures and interfaces of the Vocational Educational Training (VET) system, leg framework of VET, - Contributors and roles in the VET system, - Processes of (vocational) pedagogical professionalisation - Software tools: Word processing programme, literature management programme - Methods of scientific work: Research, source work, text production 4 Forms of teaching: Tuition in seminars 5 Participation requirements: Formal: Content: - Forms of assessment: Oral examination 7 Perequisite for the award of credit points: Module examination pass and course assessment Application of the module (in the following study programmes) Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.			150 h	5	3rd o	r 5th s	em.	Annual		1 sem	ester
Tuition in seminars 30 students 2 SCH 30 h 30 h 30 h Exercise 20 students 0 SCH 0 h 0 h 0 h Practical or seminar 15 students 0 SCH 80 h 10 h Supervised self-study 60 students 0 SCH 0 h 0 h 0 h Supervised self-study 60 students 0 SCH 0 h 0 h 0 h Learning outcomes/competences: Students: - understand vocational education as a sub-discipline of educational science, are able to distingue the respective subject areas and research fields from each other and explain them in context. - systematically reflect on exemplary practical experiences in the workplace and thereby a examine motives for their own career path. - are able to identify requirements for company and school educators and in this context understare vocational education as a profession. - can describe the structures, forms and interfaces of the vocational education and training systs in Germany in a differentiated manner and consider the historical, educational policy and leg framework conditions. - use tools of scientific work competently. Contents: - Concepts, subject areas and research fields of educational science and vocational education a sub-discipline of educational science, - Objectives, structures and interfaces of the Vocational Educational Training (VET) system, leg framework of VET, - Contributors and roles in the VET system, - Processes of (vocational) pedagogical professionalisation - Software tools: Word processing programme, literature management programme - Methods of scientific work: Research, source work, text production Forms of teaching: Tuition in seminars Participation requirements: Formal: Content: Forms of teaching: Tuition in seminars Tuition in seminars	1	Course:		Planned group	sizes	Scop	e	/ classro	oom	Self-study	
Tuition in seminars 30 students 2 SCH 30 h 30 h 30 h Exercise 20 students 0 SCH 0 h 0 h 0 h Practical or seminar 15 students 0 SCH 80 h 10 h Supervised self-study 60 students 0 SCH 0 h 0 h 0 h Supervised self-study 60 students 0 SCH 0 h 0 h 0 h Learning outcomes/competences: Students: - understand vocational education as a sub-discipline of educational science, are able to distingue the respective subject areas and research fields from each other and explain them in context. - systematically reflect on exemplary practical experiences in the workplace and thereby a examine motives for their own career path. - are able to identify requirements for company and school educators and in this context understare vocational education as a profession. - can describe the structures, forms and interfaces of the vocational education and training systs in Germany in a differentiated manner and consider the historical, educational policy and leg framework conditions. - use tools of scientific work competently. Contents: - Concepts, subject areas and research fields of educational science and vocational education a sub-discipline of educational science, - Objectives, structures and interfaces of the Vocational Educational Training (VET) system, leg framework of VET, - Contributors and roles in the VET system, - Processes of (vocational) pedagogical professionalisation - Software tools: Word processing programme, literature management programme - Methods of scientific work: Research, source work, text production Forms of teaching: Tuition in seminars Participation requirements: Formal: Content: Forms of teaching: Tuition in seminars Tuition in seminars		Lecture		60 students		0	SCH	0	h	0	h
Practical or seminar 15 students 0 SCH 80 h 10 h Supervised self-study 60 students 0 SCH 0 h 0 h Learning outcomes/competences: Students: - understand vocational education as a sub-discipline of educational science, are able to distingu the respective subject areas and research fields from each other and explain them in context. - systematically reflect on exemplary practical experiences in the workplace and thereby a examine motives for their own career path. - are able to identify requirements for company and school educators and in this context understa vocational education as a profession. - can describe the structures, forms and interfaces of the vocational education and training syste in Germany in a differentiated manner and consider the historical, educational policy and legar framework conditions. - use tools of scientific work competently. Contents: - Concepts, subject areas and research fields of educational science and vocational education a sub-discipline of educational science, - Objectives, structures and interfaces of the Vocational Educational Training (VET) system, legar framework of VET, - Contributors and roles in the VET system, - Processes of (vocational) pedagogical professionalisation - Software tools: Word processing programme, literature management programme - Methods of scientific work: Research, source work, text production 4 Forms of teaching: Tuition in seminars - Participation requirements: Formal: Content: - Forms of assessment: Oral examination - Prerequisite for the award of credit points: Module examination pass and course assessment Application of the module (in the following study programmes) Electrical Engineering B.Eng, and Mechanical Engineering B.Eng.		Tuition in	n seminars	30 students		2	SCH	30	h	30	h
Supervised self-study 60 students 0 SCH 0 h 0 h Learning outcomes/competences: Students: - understand vocational education as a sub-discipline of educational science, are able to distinguthe respective subject areas and research fields from each other and explain them in context. - systematically reflect on exemplary practical experiences in the workplace and thereby a examine motives for their own career path. - are able to identify requirements for company and school educators and in this context understa vocational education as a profession. - can describe the structures, forms and interfaces of the vocational education and training syst in Germany in a differentiated manner and consider the historical, educational policy and leg framework conditions. - use tools of scientific work competently. Contents: - Concepts, subject areas and research fields of educational science and vocational education a sub-discipline of educational science, - Objectives, structures and interfaces of the Vocational Educational Training (VET) system, leg framework of VET, - Contributors and roles in the VET system, - Processes of (vocational) pedagogical professionalisation - Software tools: Word processing programme, literature management programme - Methods of scientific work: Research, source work, text production 4 Forms of teaching: Tuition in seminars - Participation requirements: Formal: Content: Oral examination - Prerequisite for the award of credit points: Module examination pass and course assessment Application of the module (in the following study programmes) Electrical Engineering B.Eng, and Mechanical Engineering B.Eng.		Exercise		20 students		0	SCH	0	h	0	h
Learning outcomes/competences: Students: - understand vocational education as a sub-discipline of educational science, are able to distinguenthe respective subject areas and research fields from each other and explain them in context systematically reflect on exemplary practical experiences in the workplace and thereby a examine motives for their own career path are able to identify requirements for company and school educators and in this context understate vocational education as a profession can describe the structures, forms and interfaces of the vocational education and training systems in Germany in a differentiated manner and consider the historical, educational policy and legar framework conditions use tools of scientific work competently. Contents: - Concepts, subject areas and research fields of educational science and vocational education a sub-discipline of educational science, - Objectives, structures and interfaces of the Vocational Educational Training (VET) system, legar framework of VET, - Contributors and roles in the VET system, - Processes of (vocational) pedagogical professionalisation - Software tools: Word processing programme, literature management programme - Methods of scientific work: Research, source work, text production Forms of teaching: Tuition in seminars - Participation requirements: Formal: Content: - Forms of assessment: Oral examination - Prerequisite for the award of credit points: Module examination pass and course assessment - Module examination pass and course assessment - Application of the module (in the following study programmes) - Electrical Engineering B.Eng, and Mechanical Engineering B.Eng.		Practical	or seminar	15 students		0	SCH	80	h	10	h
Students: - understand vocational education as a sub-discipline of educational science, are able to distingue the respective subject areas and research fields from each other and explain them in context. - systematically reflect on exemplary practical experiences in the workplace and thereby a examine motives for their own career path. - are able to identify requirements for company and school educators and in this context understate vocational education as a profession. - can describe the structures, forms and interfaces of the vocational education and training systematic in Germany in a differentiated manner and consider the historical, educational policy and legation framework conditions. - use tools of scientific work competently. Contents: - Concepts, subject areas and research fields of educational science and vocational education a sub-discipline of educational science, - Objectives, structures and interfaces of the Vocational Educational Training (VET) system, legations from the VET, - Contributors and roles in the VET system, - Processes of (vocational) pedagogical professionalisation - Software tools: Word processing programme, literature management programme - Methods of scientific work: Research, source work, text production 4. Forms of teaching: Tuition in seminars - Participation requirements: Formal: Content: - Forms of assessment: Oral examination - Prerequisite for the award of credit points: Module examination pass and course assessment - Application of the module (in the following study programmes) Electrical Engineering B.Eng, and Mechanical Engineering B.Eng.		Supervise	ed self-study	60 students		0	SCH	0	h	0	h
Students: - understand vocational education as a sub-discipline of educational science, are able to distingue the respective subject areas and research fields from each other and explain them in context. - systematically reflect on exemplary practical experiences in the workplace and thereby a examine motives for their own career path. - are able to identify requirements for company and school educators and in this context understate vocational education as a profession. - can describe the structures, forms and interfaces of the vocational education and training systematic in Germany in a differentiated manner and consider the historical, educational policy and legation framework conditions. - use tools of scientific work competently. Contents: - Concepts, subject areas and research fields of educational science and vocational education a sub-discipline of educational science, - Objectives, structures and interfaces of the Vocational Educational Training (VET) system, legations from the VET, - Contributors and roles in the VET system, - Processes of (vocational) pedagogical professionalisation - Software tools: Word processing programme, literature management programme - Methods of scientific work: Research, source work, text production 4. Forms of teaching: Tuition in seminars - Participation requirements: Formal: Content: - Forms of assessment: Oral examination - Prerequisite for the award of credit points: Module examination pass and course assessment - Application of the module (in the following study programmes) Electrical Engineering B.Eng, and Mechanical Engineering B.Eng.		Learning	outcomes/com	netences:							
Participation requirements: Formal: Content: Forms of assessment: Oral examination Prerequisite for the award of credit points: Module examination pass and course assessment Application of the module (in the following study programmes) Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.		exa - are voc - can in (mine motives able to identif ational educat describe the s Germany in a nework condit	for their own car y requirements for ion as a profession structures, forms differentiated ma	reer path. or compa on. and inte	ny and	of the ve	educators	and in this c	ontext u	nderstan
Formal: Content: Forms of assessment: Oral examination Prerequisite for the award of credit points: Module examination pass and course assessment Application of the module (in the following study programmes) Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.	3	Contents - Cor sub - Obj frar - Cor - Pro - Sof - Met	checepts, subject discipline of ectives, struct mework of VE ntributors and cesses of (voc tware tools: We thods of scient	areas and reseateducational scientures and interfactor, roles in the VET ational) pedagog	rch fields nce, ees of the system, rical prof	Vocation ession	tional Ed alisation erature m	lucational nanagemen	Training (V	ET) sys	
Content: Forms of assessment: Oral examination Prerequisite for the award of credit points: Module examination pass and course assessment Application of the module (in the following study programmes) Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.	4	Contents - Cor sub - Obj frar - Cor - Pro - Sof - Met	cepts, subject discipline of ectives, struct mework of VE ntributors and cesses of (voc tware tools: We thought of scient teaching:	areas and reseateducational scientures and interfactor, roles in the VET ational) pedagogy ord processing patific work: Reseated	rch fields nce, ees of the system, rical prof	Vocation ession	tional Ed alisation erature m	lucational nanagemen	Training (V	ET) sys	
Oral examination Prerequisite for the award of credit points: Module examination pass and course assessment Application of the module (in the following study programmes) Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.	4	Contents - Cor sub - Obj frar - Cor - Pro - Sof - Met Forms of Tuition: Participar	cepts, subject discipline of ectives, struct mework of VE ntributors and cesses of (voc tware tools: We thought of scient teaching:	areas and reseateducational scientures and interfactor, roles in the VET ational) pedagogy ord processing patific work: Reseated	rch fields nce, ees of the system, rical prof	Vocation ession	tional Ed alisation erature m	lucational nanagemen	Training (V	ET) sys	
Prerequisite for the award of credit points: Module examination pass and course assessment Application of the module (in the following study programmes) Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.	4	Contents - Cor sub - Obj frar - Cor - Pro - Sof - Met Forms of Tuition Participal Formal:	cepts, subject discipline of ectives, struct mework of VE ntributors and cesses of (voc tware tools: We thought of scient teaching:	areas and reseateducational scientures and interfactor, roles in the VET ational) pedagogy ord processing patific work: Reseated	rch fields nce, ees of the system, rical prof	Vocation ession	tional Ed alisation erature m	lucational nanagemen	Training (V	ET) sys	
Module examination pass and course assessment Application of the module (in the following study programmes) Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.	4	Contents - Cor sub - Obj frar - Cor - Pro - Sof - Met Forms of Tuition Participar Formal: Content:	cassessment:	areas and reseateducational scientures and interfactor, roles in the VET ational) pedagogy ord processing patific work: Reseated	rch fields nce, ees of the system, rical prof	Vocation ession	tional Ed alisation erature m	lucational nanagemen	Training (V	ET) sys	
Application of the module (in the following study programmes) Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.	4 5 6	Forms of Tuition: Forms of Oral exa	cepts, subject discipline of ectives, struct mework of VE ntributors and cesses of (voc tware tools: We thought the seminars too requirement of assessment:	areas and reseateducational scientures and interfactor, roles in the VET ational) pedagogy ord processing patific work: Reseates	rch fields nce, ees of the system, rical prof	Vocation ession	tional Ed alisation erature m	lucational nanagemen	Training (V	ET) sys	
Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.	4	Forms of Tuition: Forms of Oral exa	cepts, subject discipline of ectives, struct mework of VE ntributors and cesses of (voc tware tools: We thought the company of the comp	areas and reseateducational scientures and interfactor, roles in the VET ational) pedagogy ord processing patific work: Reseates:	rch fields nce, ees of the system, gical prof programm nrch, sour	Vocan Tession me, lite rce wo	tional Ed alisation erature m	lucational nanagemen	Training (V	ET) sys	
	4 5 6	Forms of Tuition: Forms of Oral exa	cepts, subject discipline of dectives, struct mework of VE ntributors and cesses of (voc tware tools: We thought thought the scientific seminars tools requirement assessment: amination gite for the awar examination p	areas and researeducational scientures and interfactor, roles in the VET ational) pedagogy ord processing patific work: Research	rch fields nce, ses of the system, rical prof programmarch, soun	Vocan Tession me, lite rce wo	alisation erature m rk, text p	lucational nanagemen	Training (V	ET) sys	
	4 55	Forms of Tuition : Forms of Oral exa Prerequis Module Applicati	cassessment: umination site for the awar examination site for the modu	tareas and reseateducational scientures and interfact T, roles in the VET ational) pedagog Ford processing patific work: Reseated of credit points: bass and course at le (in the following	rch fields nce, ses of the system, rical prof programmarch, sound assessment g study pr	ession ne, lite rce wo	alisation erature m rk, text p	nanagemen	Training (V	ET) sys	

10	Module coordinator:
	Prof. DrIng. Thorsten Jungmann
11	Other information:
12	Language:
	German

	ational Ed	ucation II							EDU/I	3P2
Iden num	tification ber:	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duratio	n:
130′		150 h	5	6th s	em.		Annual (Summer)		1 seme	ester
1	Course:		Planned group s	izes	Scope	e	Actual co	ontact time om	Self-stud	ly
	Lecture		60 students		0	SCH	0	h	0	h
	Tuition is	n seminars	30 students		4	SCH	60	h	90	h
	Exercise		20 students		0	SCH	0	h	0	h
		or seminar	15 students		0	SCH	0	h	0	h
	Supervis	ed self-study	60 students		0	SCH	0	h	0	h
	an a	and theoretically an plan and praining, re able to descriterpret and did a training occording interfeducational Train critically re	faces to general ining (VET) reserved flect and classify edge. In this con	taking in training. of develorm a sele and su earch and current	nto acco apply oping a ected le bject-re d empin	training teaching arning finelated dical class chirend	methods a g-learning s deld based of idactics in sroom reses s in VET r	a of scient and design scenario, on the fram the conte- arch. esearch on	ific work the comp ework cu ext of Vo	, pletion of the soft the
	G									
3	- R vo - C - L - A	cientific work: esearch object ocational educt oncept of pract earning field a ction-oriented	Plan, structure, ts, research que ation and training tice or action res nd competence-c methods for traitions, training pla	estions a g research earch to oriented ning, ins	and result, explored design truction	earch ne own te	nethods in aching, ns,		n and tra	ining (
3	- So - R vo - C - L - A - T	cientific work: esearch object ocational educt oncept of prace earning field a ction-oriented raining regular teaching:	ts, research que ation and training tice or action res nd competence-or methods for trai	estions a g research earch to oriented ning, ins	and result, exploredesign tructio	earch ne own te	nethods in aching, ns,		n and tra	ining o
	- Solution - Solution - Rorms of Tuition - Participa Formal:	cientific work: esearch object ocational educt oncept of pract earning field a ction-oriented raining regular	ts, research que ation and training tice or action res nd competence-o methods for trai tions, training pla	estions a g research earch to oriented ning, ins	and result, exploredesign tructio	earch ne own te	nethods in aching, ns,		n and tra	ining o
ı	- Solution - Content:	cientific work: esearch object ocational educt oncept of prace earning field a ction-oriented raining regular Teaching: in seminars tion requirement Tassessment:	ts, research que ation and training tice or action res nd competence-o methods for trai tions, training pla	estions a g research earch to oriented ning, ins	and result, exploredesign tructio	earch ne own te	nethods in aching, ns,		n and tra	ining o

8	Application of the module (in the following study programmes)
	Electrical Engineering B.Eng. and Mechanical Engineering B.Eng.
9	Importance of the grade for the final grade:
	according to BRPO
10	Module coordinator:
	Prof. DrIng. Thorsten Jungmann
11	Other information:
12	Language:
	German

Bus	iness Adm	inistration							BW	
Iden num	tification	Workload:	Credits:	Stud	semest	er:	Frequency offer	of the	Duratio	n:
102		150 h	5	3rd seme	or	5th	Annual (Winter)		1 seme	ester
1	Course:		Planned group s	sizes	Scope	e	Actual c / classro teaching		Self-stuc	ly
	Lecture		60 students		3	SCH	45	h	67.5	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	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
	their eff	ects.								
3	Contents		s of business adr	ministrat	ion / ba	sic prin	ciples of ea	conomic ac	tion	
3	•	Basic concept Overview of t and information Corporate goa	s of business adr he entrepreneuria on economy leve als and corporate s of private and corate law	al functi l key figu	onal are	eas of th	e goods ec			onomy
3	Forms of	Basic concept Overview of t and informatic Corporate goa Basic concept Forms of corp	he entrepreneuria on economy leve als and corporate s of private and o	al functi l key figu commer	onal are	eas of the	e goods ec	onomy, fin		onomy
	Forms of Lecture,	Basic concept Overview of t and informatic Corporate goa Basic concept Forms of corp	the entrepreneuria on economy leve als and corporate is of private and of corate law	al functi l key figu commer	onal are	eas of the	e goods ec	onomy, fin		onomy
4	Forms of Lecture,	Basic concept Overview of t and informatic Corporate goa Basic concept Forms of corp Teaching: , seminar-base tion requiremen	the entrepreneuria on economy leve als and corporate is of private and of corate law	al functi l key figu commer	onal are	eas of the	e goods ec	onomy, fin		onomy
4	Forms of Lecture, Participa Formal: Content:	Basic concept Overview of t and informatic Corporate goa Basic concept Forms of corp Teaching: seminar-base tion requirement assessment:	the entrepreneuria on economy leve als and corporate is of private and corate law d teaching with contract	al functi l key figu commerc case stuc	onal are	eas of the	e goods ec	es	ancial ec	
5 6	Forms of Lecture, Participa Formal: Content: Forms of Written	Basic concept Overview of t and informatio Corporate goa Basic concept Forms of corp Teaching: Seminar-base tion requirement Tassessment: examination,	the entrepreneuria on economy leve als and corporate s of private and of orate law d teaching with of tts:	al functi l key figu commerc case stuc	onal are	eas of the	e goods ec	es	ancial ec	
4 5	Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis	Basic concept Overview of t and informatic Corporate goa Basic concept Forms of corp Teaching: seminar-base tion requirement assessment: examination, site for the awar	the entrepreneuria on economy leve als and corporate is of private and corate law distance the corate is of teaching with contact is:	al functi l key figu commerc case stuc	onal are	eas of the	e goods ec	es	ancial ec	
5 6	Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module	Basic concept Overview of t and informatic Corporate goa Basic concept Forms of corp Teaching: seminar-base tion requirement assessment: examination, site for the awar examination p	the entrepreneuria on economy leverals and corporate is of private and corate law distribution examples of credit points:	al functi l key figu commerc case stuc mination	onal are	eas of the sy figure see studion	e goods ec	es	ancial ec	
5 7	Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati Electrica	Basic concept Overview of t and informatio Corporate goa Basic concept Forms of corp Teaching: Seminar-base tion requirement assessment: examination, site for the awar examination p ion of the modu al Engineering	the entrepreneuria on economy leve als and corporate is of private and corate law detaching with continuous description of the combination examples of the combination exa	al function land land land land land land land lan	onal are	eas of the ey figure see studion rmance	e goods ec	es on or oral e	xaminatio	on
4 5 7 8	Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati Electrica B.Eng. a	Basic concept Overview of t and informatio Corporate goa Basic concept Forms of corp Teaching: Seminar-base tion requirement cassessment: examination, site for the awar examination prion of the modu al Engineering and Renewable	the entrepreneuria on economy leverals and corporate is of private and corate law detaching with contact in the combination examples of credit points: Description of the combination examples of the	al function leads to the commercial study partial commercial study partial control con	onal are	eas of the ey figure see studion rmance	e goods ec	es on or oral e	xaminatio	on
5 7	Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati Electrica B.Eng. a Importan	Basic concept Overview of t and informatio Corporate goa Basic concept Forms of corp Teaching: Seminar-base tion requirement assessment: examination, on the modulal Engineering and Renewable tice of the grade	the entrepreneuria on economy leve als and corporate is of private and corate law detaching with continuous description of the combination examples of the combination exa	al function leads to the commercial study partial commercial study partial control con	onal are	eas of the ey figure see studion rmance	e goods ec	es on or oral e	xaminatio	on
456789	Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati Electrica B.Eng. a Importan accordir	Basic concept Overview of t and informatio Corporate goa Basic concept Forms of corp Teaching: Seminar-base tion requirement cassessment: examination, on the awar examination proportion of the modulal Engineering and Renewable tice of the grade ting to BRPO	the entrepreneuria on economy leverals and corporate is of private and corate law detaching with contact in the combination examples of credit points: Description of the combination examples of the	al function leads to the commercial study partial commercial study partial control con	onal are	eas of the ey figure see studion rmance	e goods ec	es on or oral e	xaminatio	on
4 5 7 8	Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati Electricati B.Eng. a Important accordir Module of	Basic concept Overview of t and informatic Corporate goa Basic concept Forms of corp Teaching: Seminar-base tion requirement examination, site for the awar examination prion of the modulal Engineering and Renewable for the grade and to BRPO coordinator:	the entrepreneuria on economy leverals and corporate is of private and corate law detaching with contact in the combination examples of credit points: pass le (in the following B.Eng, Enginee e Energies B.Eng for the final grade:	al function key figure commercial commercial case studies and the commercial case studies and the case studies are studies	onal are	eas of the ey figure see studion rmance	e goods ec	es on or oral e	xaminatio	on
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12 Language:
German

	hine Vision	ı							BIL	
Ident numb	ification per:	Workload:	Credits:	Study	semes	ter:	Frequency	y of the	Duratio	on:
1029)	150 h	5	5th s	emeste	er	Annual (Winter)		1 seme	ester
1	Course:		Planned group s	sizes	Scop	le	Actual of / classro teaching		e Self-stud	ly
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical of	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
3		ng independer	stand and internant solutions in si						e vision. C	Capable o
3	Historica acquisitio	al overview a on, basics of to	nd current deve echnical optics f	elopmen	ts in r	nachine	vision, se	ensor syst	ems for in	nage dat
	contour a matching biotechne	analysis and e g, colour ima ological and n	, handling macidge detection, fige processing, nedical applications for process m	hine vis ilters in applicat ons, desi	ion pro the spa ions o gn of r	ogramme atial and f machin	es, LUT a frequency ne vision	and grey range, m as a qua	value prog norphology ality assura	gramming , template ance tool
4	contour a matching biotechno design of	analysis and eg, colour ima ological and n f vision systen	, handling mach edge detection, f ge processing, nedical application	hine vis ilters in applicat ons, desi	ion pro the spa ions o gn of r	ogramme atial and f machin	es, LUT a frequency ne vision	and grey range, m as a qua	value prog norphology ality assura	gramming , template ance tool
4	contour a matching biotechnodesign of	analysis and eg, colour ima ological and n f vision systen	, handling mac edge detection, f ge processing, nedical applications for process m	hine vis ilters in applicat ons, desi	ion pro the spa ions o gn of r	ogramme atial and f machin	es, LUT a frequency ne vision	and grey range, m as a qua	value prog norphology ality assura	gramming , template ance tool
	contour a matching biotechnodesign of Forms of Lecture,	analysis and eg, colour ima ological and n f vision systen teaching:	handling mach dedge detection, f ge processing, nedical applications for process m	hine vis ilters in applicat ons, desi	ion pro the spa ions o gn of r	ogramme atial and f machin	es, LUT a frequency ne vision	and grey range, m as a qua	value prog norphology ality assura	gramming , template ance tool
	contour a matching biotechnodesign of Forms of Lecture,	analysis and eg, colour ima ological and n f vision systen teaching: practicals and	edge detection, for the processing, nedical applications for process multiple exercises the exercises the process the exercises the exercise the ex	hine vis ilters in applicat ons, desi	ion pro the spa ions o gn of r	ogramme atial and f machin	es, LUT a frequency ne vision	and grey range, m as a qua	value prog norphology ality assura	gramming , templat ance tool
	Forms of Lecture, Participati	analysis and eg, colour ima ological and n f vision system teaching: practicals and ion requirement None None	ded exercises described exercises described exercises described exercises described exercises described exercises	hine vis ilters in applicat ons, desi	ion pro the spa ions o gn of r	ogramme atial and f machin	es, LUT a frequency ne vision	and grey range, m as a qua	value prog norphology ality assura	gramming , templat ance tool
5	Forms of Lecture, Participating Content:	analysis and eg, colour ima ological and n f vision system teaching: practicals and ion requirement None None assessment:	exercises lexercises	hine vis ilters in applicat ons, desi conitoring	ion prothe spaions of gn of r	ogramme atial and f machin machine	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming r, templat ance too n software
5	Forms of Lecture, Participati Formal: Content: Forms of Written e	teaching: practicals and ion requirement None assessment: examination, c	exercises exercises exercises exercises	hine vis ilters in applicat ons, desi conitoring	ion prothe spaions of gn of r	ogramme atial and f machin machine	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming f, templat ance too n software
5	Forms of Lecture, Participati Forms of Written e Prerequisi	teaching: practicals and ion requirement None None assessment: examination, content of the award	exercises exercises combination exad of credit points:	hine vis ilters in applicat ons, desi onitoring	ion prothe spaions or gn of r	ogramme atial and f machin machine	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming r, templat ance too n software
5 6 7	Forms of Lecture, Participati Forms of Written e Prerequisi Module e	teaching: practicals and ion requirement None None assessment: examination, context in the awardexamination properties and in the awardexamination properties and in the awardexamination properties and in the awardexamination properties are awardexamination properties.	exercises exercises exercises exercises	hine visilters in applications, desired in application in applicat	ion prothe spaions or gn of r	ogramme atial and f machin machine v	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming r, templat ance too n software
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5 6 7	Forms of Lecture, Participating Formal: Content: Forms of Written of Prerequisis Module of Application Apparating Engineers	teaching: practicals and ion requirement None assessment: examination, content of the modul ve Biotechnoling and Mana	exercises	mination ussessmen g study pr	ion prothe spaions of gn of r	ogramme atial and f machine v machine v ormance e	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming r, templat ance too n software
5 6 7 8	Forms of Lecture, Participati Formal: Content: Forms of Written of Prerequisi Module of Application Apparati Engineer Importance	teaching: practicals and ion requirement None assessment: examination pon of the modul ve Biotechnoleing and Manage of the grade i	exercises combination exact dof credit points: ass and course ase (in the following togy B.Sc., Elect	mination ussessmen g study pr	ion prothe spaions of gn of r	ogramme atial and f machine v machine v ormance e	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming r, templat ance too n software
5 6 7 8	Forms of Lecture, Participati Formal: Content: Forms of Written of Application Apparati Engineer Importance according	teaching: practicals and ion requirement None assessment: examination pon of the modul ve Biotechnoling and Manage of the grade ig to BRPO	exercises	mination ussessmen g study pr	ion prothe spaions of gn of r	ogramme atial and f machine v machine v ormance e	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming r, templat ance too n software
5 6 7 8	Forms of Lecture, Participation Formal: Content: Forms of Written of Module of Apparation Engineer Importance according Module of Module	teaching: practicals and ion requirement None assessment: examination, content of the modul ve Biotechnoling and Manage of the grade in grade ion grade ion requirement None assessment: examination pon of the modul ve Biotechnoling and Manage of the grade in grade in grade in grade in grade ion ordinator:	exercises combination exact of credit points: ass and course are (in the following togy B.Sc., Elect togement B.Sc. for the final grade:	mination ussessmen g study pr	ion prothe spaions of gn of r	ogramme atial and f machine v machine v ormance e	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming t, templat ance too n software
5 6 7 8 8	Forms of Lecture, Participation Forms of Written of Module of Apparation Engineer Importance according Module of Prof. Dr.	teaching: practicals and ion requirement None assessment: examination, content of the modul ve Biotechnoling and Manage of the grade in g to BRPO coordinator: -Ing. Reinhard	exercises combination exact of credit points: ass and course are (in the following togy B.Sc., Elect togement B.Sc. for the final grade:	mination ussessmen g study pr	ion prothe spaions of gn of r	ogramme atial and f machine v machine v ormance e	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming t, templat ance too n software
4 5 7 8 8 9 10	Forms of Lecture, Participating Module of Apparating Engineer Importance according Module of Prof. Dr. Other info	teaching: practicals and ion requirement None assessment: examination point the modul ve Biotechnoling and Manage of the grade in g to BRPO poordinator: -Ing. Reinhard promation:	exercises combination exact of credit points: ass and course are (in the following togy B.Sc., Elect togement B.Sc. for the final grade:	mination ssessmen g study pr	ion prothe spaions of gn of r	ogramme atial and f machine variation machine variation or mance emes) ng B.Eng	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming r, templat ance too n software
5 6 7 8 8	Forms of Lecture, Participating Module of Apparating Engineer Importance according Module of Prof. Dr. Other info	teaching: practicals and ion requirement assessment: examination, content of the modul of the m	exercises the combination example of the following of the following ogy B.Sc., Elector the final grade: d Kaschuba	mination ssessmen g study pr	ion prothe spaions of gn of r	ogramme atial and f machine variation machine variation or mance emes) ng B.Eng	es, LUT a frequency ne vision vision syst	and grey y range, n as a qua tems, mac	value prog norphology ality assur- hine vision	gramming r, templat ance too n software

Occi	upational I	Fields of Elect	trical Engineers						BER	
Ident numl	tification	Workload:	Credits:	Study	y semes	ter:	Frequency	of the	Durati	on:
1018		120 h	4	1st s	em.		Annual (Winter)		1 sem	ester
1	Course:		Planned group	sizes	Scop	e	Actual of / classro teaching		Self-stu	dy
	Lecture		60 students		2	SCH	30	h	50	h
	Tuition in	n seminars	30 students		1	SCH	15	h	25	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		0	SCH	0	h	0	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
)	Learning	outcomes/com	petences:							
	con	npany								
	deso - Cor occ	ate the indivice or ibe the individual of the in	dual departments vidual interfaces up dynamic proceds						_	
3	Contents - Em - Tra - Eng - Mai - Sec - Dire - Sala - Tea	ate the individual cribe the individual cribe the individual cribe the individual cribe the initial cribe the individual cr	e engineering pro- dern industrial co- ng power, supply activities of the on of fields of acti- and career oppor- ons, roles and per-	fession f Engine mpanies and der engineer ivity: Ind	eering busin mand, g	ess units goods, ne	eeds ses and pu	of personal	lities in i	
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ļ	Contents - Em - Tra - Eng - Mai - Sec - Dire - Sala - Tea - Sof Forms of Lecture game or Participar	ate the individual cribe the ining for Backgineers in modulate the comparison ary structures are composition to skills in engineers in composition the cribe the comparison composition the initial cribe in the initial cr	vidual interfaces up dynamic proceeds e engineering proceeds e engineering proceeds e engineering proceeds nelor or Master of the supply activities of the and career opportune, roles and perfineering to based teaching weats:	fession f Engine mpanies and der engineer ivity: Ind	d differ eering , busin mand, g dustrial	ess units goods, ne l enterpri	eeds ses and pu	of personal	lities in i	ndividu
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+	Contents - Em - Tra - Eng - Mai - Sec - Dir - Sala - Tea - Sof Forms of Lecture game or Participal Formal: Content:	ate the individent of the ining for Backgineers in modurated in the initial	e engineering production of Master o	fession f Engine mpanies and der engineer ivity: Ind	d differ eering , busin mand, g dustrial	ess units goods, ne l enterpri	eeds ses and pu	of personal	lities in i	ndividu
1	Contents - Em - Tra - Eng - Mai - Sec - Dir - Sala - Sof Forms of Lecture game or Participal Formal: Content:	ate the individent of the ining for Backgineers in modurated the ining for Backgineers in modulated the ining for Backgineers in modulated the ining for Backgineers in modulated the initial to the initial	e engineering production of Master o	fession f Engine mpanies and der engineer ivity: Ind	d differ eering , busin mand, g dustrial	ess units goods, ne l enterpri	eeds ses and pu	of personal	lities in i	ndividu
5	Contents - Em - Tra - Eng - Ma - Sec - Dir - Sala - Tea - Sof Forms of Lecture game or Participar Formal: Content:	ate the individent at the individent at the individent and individent at the individ	e engineering production of Master o	fession f Engine mpanies and der engineer ivity: Ind	d differ eering , busin mand, g dustrial	ess units goods, ne l enterpri	eeds ses and pu	of personal	lities in i	ndividu
5	Contents - Em - Tra - Eng - Mai - Sec - Dire - Sala - Tea - Sof Forms of Lecture game or Participal Formal: Content: Forms of Course a Prerequis	ate the individual cribe to grow and main ect comparison ary structures are composition to skills in engineers in modern composition to skills in engineers and seminar-le excursions. The individual cribe is a structure of the individual cribe is	vidual interfaces up dynamic proceds e engineering proceder of Master of the most of the m	fession f Engine mpanies and der engineer ivity: Inc tunities sonalitie	d difference deering to busing the dustrial dustrial deet and	ess units goods, ne l enterpri e profess group we	eeds ses and pu	of personal	lities in i	ndividu
55	Contents - Em - Tra - Eng - Mai - Sec - Dir - Sala - Tea - Sof Forms of Lecture game or Participal Formal: Content: Forms of Course a Applicati	ate the individent at the individent at the individent and proposition at the individent at the indivi	vidual interfaces up dynamic proceds e engineering proceder of Master of the most of the m	fession f Engine mpanies and der engineer ivity: Inc tunities sonalitie	d difference deering to busing the dustrial dustrial deet and	ess units goods, ne l enterpri e profess group we	eeds ses and pu	of personal	lities in i	ndividu
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55	Contents - Em - Tra - Eng - Mai - Sec - Dir - Sala - Sof Forms of Lecture game or Participal Formal: Content: Forms of Course a Applicati Electrica Importan	ate the individent at the ining for Backgineers in modulated at the ining for the ining for the initial state of the individual at the initial state of the initial stat	vidual interfaces up dynamic proceds e engineering proceder of Master of the most of the m	fession f Engine mpanies and der engineer ivity: Ind tunities sonalitie	d difference deering to busing the dustrial description and the decrease of th	ess units goods, ne l enterpri e profess group we	eeds ses and pu	of personal	lities in i	ndividu

	DiplIng. Vanessa Prott-Warner
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

Dece	entralised F	Energy Syst	ems							DEC	
Ident	ification per:	Workload	Credits		Study	semest	er:	Frequency	of the	Duratio	on:
1042	2	150 h	5		5th se	em.		Annual (Winter)		1 seme	ester
1	Course:		Planned gro	oup size	es	Scope)	Actual of / classro teaching		Self-stud	ly
	Lecture		60 students			2	SCH	30	h	45	h
	Tuition in	seminars	30 students			1	SCH	15	h	22.5	h
	Exercise		20 students			0	SCH	0	h	0	h
	Practical of	or seminar	15 students			1	SCH	15	h	22.5	h
	Supervise	d self-study	60 students			0	SCH	0	h	0	h
			are familiar w ess the reliabili						odelling d	ecentralis	ed energy
3	Contents:										
	Structure	and functi	on of the Germ	an ene	ergy m	arket (_]	power e	xchange).	Design and	l structure	of
	Working		alised energy s for combined h ms				ration. I	Reliability	and availal	bility of el	lectrical
4	Forms of										
		-	sed teaching w	ith exe	ercises	and pr	actical c	course			
5		on requirem									
	Formal:	No	one								
	Content:	No	one								
6		assessment:									
			nination; in eac		with p	orelimi	nary exa	amination	performano	ce	
7			ard of credit poi								
0			n pass with pred								
8	Electrica	l Engineeri	dule (in the follong B.Eng. and	Renev				; .			
9	_	e of the grad g to BRPO	le for the final gr	ade:							
10		ordinator:									
10		Ing. Jens I	Haubrock								
11	Other info										
			nounced at the	begin	ning o	f the co	ourse.				
12	Language										
	German										

	gnosis and	Support							EDU/D	UF
[den	tification ber	Workload:	Credits:	Study	semes	ter:	Frequency	of the	Duration	n:
1304		150 h	5	4th s	em.		Annual (Summer	·)	1 semes	ster
1	Course:		Planned group s	izes	Scop	e	Actual of / classro teaching		Self-study	y
	Lecture		60 students		0	SCH	0	h	0	h
	Tuition in	n seminars	30 students		4	SCH	60	h	90	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		0	SCH	0	h	0	h
	Supervise	ed selfstudy	60 students		0	SCH	0	h	0	h
2	The stud - can able - have find - are syst exan - kno bacl lear - have	explain selected to point out a decing into accordings into according to demonstrations. We teaching for the decing environment of the demonstration of the decing of the decing environment according to the decing environment of the decing environment	ted learning theorapplication refere competence and abount. Instrate the significances its consecutive relevant neir own learningments, plan and coderstanding of the	inces from apply it icance of quences, to learn g biographonduct a	m the composition of composition and composition and composition and composition of the c	different context betence of cially for d can re experier iate form	theories in of pedago prientation or the deserted on the traces. They are of assess of assess of the original or the deserted on the traces.	for the vociginal action for the vocigin of conheir significate able to sment.	nded man , taking en cational ecompetence- cance aga to design e	nner. mpirica ducation oriente ninst the
		cesses.	lave basic known	edge of				eneity in lea f learners		
3	Contents: - Cog - Lea - Tea - Con - Indi - Prof - Rese	gnitive develorning theories ching and per npetence ories viduality and fessional teach	pment and person and motivation, formance measur ntation, competer heterogeneity in hing perception, lological basics of	nality de rement, nce-orien learning	velopn	nent, aminations, indivi	ons, dual suppo	of learners	and their	learnir
3	Contents: - Cog - Lear - Tear - Con - Indi - Prof - Rese and Forms of	enitive develorning theories ching and per npetence ories ividuality and fessional teachearch method assessment enteaching:	pment and persons and motivation, formance measure nation, competer heterogeneity in hing perception, lological basics or trors.	nality de rement, nce-orien learning	velopn	nent, aminations, indivi	ons, dual suppo	of learners	and their	learnir
	Contents: - Cog - Lea - Tea - Con - Indi - Prof - Rese and Forms of Tuition i	gnitive develorning theories ching and per npetence orienviduality and fessional teachearch method assessment enteaching:	pment and persons and motivation, formance measure nation, competer heterogeneity in hing perception, lological basics or trors.	nality de rement, nce-orien learning	velopn	nent, aminations, indivi	ons, dual suppo	of learners	and their	learnir
1	Contents: - Cog - Lea - Tea - Con - Indi - Prof - Rese and Forms of Tuition i Participat Formal:	enitive develorning theories ching and per npetence ories ividuality and fessional teachearch method assessment enteaching:	pment and persons and motivation, formance measure nation, competer heterogeneity in hing perception, lological basics or trors.	nality de rement, nce-orien learning	velopn	nent, aminations, indivi	ons, dual suppo	of learners	and their	learnii
1	Contents: - Cog - Lea - Tea - Con - Indi - Prof - Rese and Forms of Tuition i Participat Formal: Content:	enitive develorning theories ching and per npetence orientividuality and fessional teachearch method assessment enteaching: In seminars In seminars In requirement	pment and persons and motivation, formance measure nation, competer heterogeneity in hing perception, lological basics or trors.	nality de rement, nce-orien learning	velopn	nent, aminations, indivi	ons, dual suppo	of learners	and their	learnii
1	Contents: - Cog - Lead - Tead - Con - Indi - Prof - Rese and Forms of Tuition i Participat Formal: Content:	gnitive develorning theories ching and per npetence orienviduality and fessional teachearch method assessment exteaching: In seminars I seminar	pment and persons and motivation, formance measure nation, competer heterogeneity in hing perception, lological basics or trors.	nality de rement, nce-orien learning	velopn	nent, aminations, indivi	ons, dual suppo	of learners	and their	learni
5	Contents: - Cog - Lead - Tead - Con - Indi - Prof - Rese and Forms of Tuition i Participat Formal: Content: Forms of Oral exa	gnitive develorning theories ching and per npetence orienviduality and fessional teach method assessment exteaching: In seminars I seminars I assessment: I mination	pment and person and motivation, formance measure that the formance of the for	nality de rement, nce-orien learning	velopn	nent, aminations, indivi	ons, dual suppo	of learners	and their	learni
5	Contents: - Cog - Lear - Teac - Con - Indi - Prof - Rese and Forms of Tuition i Participat Formal: Content: Forms of Oral exa Prerequis	enitive develorning theories ching and per petence ories viduality and fessional teachearch method assessment enteaching: In seminars ion requirement assessment: In mination ite for the awards	pment and person and motivation, formance measure that the formance measure that the following perception, the follogical basics of the following perception, the follogical basics of the following perception, and the following perception are the following perception the fo	nality de rement, nce-orien learning	velopn	nent, aminations, indivi	ons, dual suppo	of learners	and their	learnii
1	Contents: - Cog - Lear - Tear - Con - Indi - Prof - Rese and Forms of Tuition i Participat Formal: Content: Forms of Oral exa Prerequis Module	enitive develorning theories ching and per petence ories ividuality and fessional teachearch method assessment enteaching: In seminars ion requirement assessment: In mination ite for the aware examination per	pment and persons and motivation, formance measure that the interest of the person in the interest of the inte	rement, nce-orien learning	velopm nted ex g group vation,	nent, aminations, indivi	ons, dual suppo	of learners	and their	learnii
5	Contents: - Cog - Lea - Tea - Con - Indi - Prof - Rese and Forms of Tuition i Participat Formal: Content: Forms of Oral exa Prerequis Module Application	gnitive develorming theories ching and per repetence orient ividuality and fessional teachearch method assessment exteaching: In seminars iton requirement assessment: mination ite for the aware examination pon of the module	pment and person and motivation, formance measure that the formance measure that the following perception, the follogical basics of the following perception, the follogical basics of the following perception, and the following perception are the following perception the fo	rement, nce-orien learning on obser	velopm nted ex group vation,	nent, aminations, indivi	ons, dual suppo	of learners	and their	learni

	according to BRPO
10	Module coordinator:
	Prof. DrIng. Thorsten Jungmann
11	Other information:
12	Language:
	German

Intro	oduction to	Electrical Po	wer Engineering						EN	
den	tification ber:	Workload:	Credits:	Stuc	ly semes	ter:	Frequenc offer	y of the	Duratio	on:
105	1	150 h	5	4th	sem.		Annual (Summe	r)	1 seme	ester
[Course:		Planned group	sizes	Scop	e	Actual / classro teachin		Self-stud	dy
	Lecture		60 students		3	SCH	45	h	67.5	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		0	SCH	0	h	0	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
	- exp - exp - exp	lain the key fi lain and comp lain electrical l out the econd	module, students gures of the elec- pare electrical net power supply eq omic efficiency o	trical er works t uipmer	nergy su for the s it	pply upply of	f electrical	energy		
	Operatir Symmet Three-po Transfor Power fa	ng resources. rical compone ole short circu rmers and volt actor correction rves, load leve	its. age maintenance on.							
ļ		teaching:								
		and exercises								
5	Formal:	Non-	e		,	ec :		D : :	T-1	
	Content:		ulation of matric neering	es, 1st	order di	rrerentia	ı equatıon	s. Basic lay	ers Electi	rıcal
6		assessment:	neering							
7	Prerequis		d of credit points:							
3	Applicati		le (in the following	g study p	orogramn	nes)				
)	Importan		for the final grade:							
10	Module o	coordinator: Ing. Jürgen S	Schlabbach							
1	Other inf Literatur Schlabb	ormation: re will be anno ach:.: Elektroo	ounced at the beg energieversorgun Reese, Schlabbac	ig:.: 3. <i>I</i>	Auflage:	.: VDE-	_	:.:VDE-Verl	lag	

Pow	ver Generat	ion and Distri	bution 1						EV1	
	tification ber:	Workload:	Credits:	Stud	ly semest	ter:	Frequenc offer	y of the	Duratio	on:
105	7	150 h	5	5th	sem.		Annual (Winter)		1 seme	ester
1	Course:		Planned group s	sizes	Scop	e	Actual / classro teaching		Self-stud	dy
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	seminars	30 students		1	SCH	15	h	22.5	h
	Б		20 1 1		0	COLL		1,	0	,
	Exercise		20 students 15 students		0	SCH SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
2	Learning	outcomes/comp	petences:			ļ				
	- clas		pes of star point to rol procedures regulations			T				
3	Contents:									
	Equivale Symm. a	ent circuits in	the design of equal the zero system. reuits. Short-circuits.	_						
	_		treatment and de	esign.						
		or regulation.								
		nected operati	on.							
	Grid reg									
4	Forms of	ls and regulati	ons							
•		-	or term papers	or semi	nar pres	entation				
5		ion requiremen			•					
	Formal:	None								
	Content:		trical machines (1059)						
6		assessment: examination								
7			d of credit points:							
,	_		eass and course a	ssessm	ent					
8			le (in the following			nes)				
		l Engineering		- 1						
9	_		for the final grade:							
		g to BRPO								
10		oordinator:	Sahlabbaab							
11	Other info	-Ing. Jürgen S	ochiaobach							
11			ounced at the beg	oinning	of the c	Ourse				
			energieversorgun				Verlag			
			nktbehandlung:.:	_	_		_			
			lussstromberech							
12	Language									

Pow	er Generati	ion and Distr	ibution 2						EV2	
Ident	tification ber:	Workload:	Credits:	Study	y semest	er:	Frequency offer	of the	Duratio	on:
1058	3	150 h	5	6th s	sem.		Annual (Summer	·)	1 seme	ester
1	Course:		Planned group	sizes	Scop	e	Actual of / classro teaching		Self-stuc	ly
	Lecture		60 students		3	SCH	45	h	67.5	h
	Tuition in	seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	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
2	Learning	outcomes/com	petences:							•
	Dimension grid reac	· ·	its, equipment and	d grids,	evaluati	ion of the	e grid con	nection of §	generatio	n plants,
3	Contents:									
	connection	on conditions	nagnetic effects of for wind, photoverhead lines and	voltaic sy	ystems,	etc. Grid	ł stability.	HVDC sys		
4	Forms of	taaahina								
	Lectures	and exercise	s or term papers	or semin	ar pres	entation				
5		ion requiremen								
	Formal:	Non	ie							
	Q 4 4									
	Content:	Pow	ver Generation an	ıd Distril	bution 1	(1057),	Power El	ectronics (1138)	
6		Powassessment:	ver Generation an	d Distril	bution 1	(1057),	Power El	ectronics (1138)	
6	Forms of		er Generation an	nd Distril	bution 1	(1057),	Power El	ectronics (1138)	
6	Forms of Written	assessment:	rer Generation an	d Distril	bution 1	(1057),	Power El	ectronics (1138)	
	Forms of Written of Prerequisi	assessment: examination ite for the awa				(1057),	Power El	ectronics (1138)	
	Forms of Written of Prerequisit Module of	assessment: examination ite for the awa examination	rd of credit points:	assessme	ent		Power El	ectronics (1138)	
7	Forms of Written of Prerequisi Module of Application	assessment: examination ite for the awa examination	rd of credit points: pass and course and cou	assessme	ent		Power El	ectronics (1138)	
7	Forms of Written of Prerequisis Module of Application Electrica	assessment: examination ite for the awa examination on of the mode 1 Engineering	rd of credit points: pass and course and cou	assessme g study p	ent		Power El	ectronics (1138)	
7	Forms of Written of Prerequisis Module of Application Electrical Importance according	assessment: examination ite for the awa examination on of the mode 1 Engineering the of the grade g to BRPO	rd of credit points: pass and course and course and course and general part of the following B.Eng.	assessme g study p	ent		Power El	ectronics (1138)	
7 8	Forms of Written e Prerequisi Module e Application Electrica Importance according Module co	assessment: examination ite for the awa examination on of the mode 1 Engineering ee of the grade g to BRPO oordinator:	rd of credit points: pass and course and (in the following B.Eng. for the final grade	assessme g study p	ent		Power El	ectronics (1138)	
7 8 9	Forms of Written e Prerequisi Module e Application Electrica Importance according Module co Prof. Dr.	assessment: examination ite for the awa examination on of the mode 1 Engineering the of the grade g to BRPO oordinator: -Ing. Jürgen	rd of credit points: pass and course and (in the following B.Eng. for the final grade	assessme g study p	ent		Power El	ectronics (1138)	
7 8 9	Forms of Written of Prerequisis Module of Application Electrica Important according Module of Prof. Dr. Other info	assessment: examination the for the awa examination on of the mode I Engineering the of the grade g to BRPO oordinator: -Ing. Jürgen ormation:	rd of credit points: pass and course a ile (in the followin g B.Eng. for the final grade	assessme g study p	ent rogramn	nes)	Power El	ectronics (1138)	
7 8 9	Forms of Written of Written of Written of Written of Prerequisis Module of Application Electrica Important according Module of Prof. Dr. Other info	assessment: examination ite for the awa examination on of the mode 1 Engineering te of the grade g to BRPO coordinator: -Ing. Jürgen ormation: e will be ann	rd of credit points: pass and course a tle (in the followin g B.Eng. for the final grade Schlabbach ounced at the beg	nssessme g study p :	ent rogramn	nes)		ectronics (1138)	
7 8 9	Forms of Written of Written of Written of Written of Prerequisis Module of Application Electrica Important according Module of Prof. Dr. Other info Literature Schlabba	assessment: examination ite for the awa examination on of the mode 1 Engineering the of the grade g to BRPO coordinator: -Ing. Jürgen ormation: e will be ann ach:.: Elektro	rd of credit points: pass and course a tle (in the followin g B.Eng. for the final grade Schlabbach ounced at the beg energieversorgur	assessme g study p	ent rogramn of the couflage:	ourse.	Verlag		1138)	
7 8 9	Forms of Written e Prerequisi Module e Application Electrica Importance according Module con Prof. Dr. Other infortation Literature Schlabba Just, Hor	assessment: examination ite for the awa examination on of the mode I Engineering ee of the grade g to BRPO oordinator: -Ing. Jürgen ormation: e will be ann ach:.: Elektro	rd of credit points: pass and course a tle (in the followin g B.Eng. for the final grade Schlabbach ounced at the beg	essessme g study p : ginning o	ent rogramm of the couflage: gen:.: V	ourse. .: VDE-'	Verlag		1138)	
7 8 9	Forms of Written e Prerequisi Module e Application Electrica Importance according Module con Prof. Dr. Other infortation Literature Schlabba Just, Hor	assessment: examination ite for the awa examination on of the mode 1 Engineering the of the grade g to BRPO coordinator: -Ing. Jürgen ormation: e will be ann ach Elektro ormann, Schla hlabbach N	rd of credit points: pass and course and (in the following B.Eng. for the final grade Schlabbach ounced at the begenergieversorgur bbach:: Netzrücl	essessme g study p : ginning o	ent rogramm of the couflage: gen:.: V	ourse. .: VDE-'	Verlag		1138)	

Ene	rgy Storage	e Devices and	Fuel Cells						EEB	
Identification number: 1056		Workload:	Credits:	Stud	Study semester: 5th sem.		Frequency of the offer Annual (Winter)		Duration: 1 semester	
		150 h	5	5th s						
1	Course:		Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study	
	Lecture		60 students		2 SCH		30 h		45 h	
	Tuition in seminars		30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervised self-study		60 students		0	SCH	0	h	0	h
3	mass, pu to powe dimension	basics of sele imped storage er and energy oning of storage		g magne ication	etic ener examp	rgy stora les of	nge). Class storage sy	ification of	storage a	ccordin
3	Physical mass, put to power dimension	basics of sele imped storage er and energy oning of storage	, superconducting y storage. Appl	g magne ication	etic ener examp	rgy stora les of	nge). Class storage sy	ification of	storage a	ccordin
3	Physical mass, puto power dimensional Fuel cell	basics of sele imped storage er and energy oning of storage I systems, stru	, superconducting y storage. Appl ge systems. cture and classifi	g magne ication cation o	examp	rgy stora les of red techi	nge). Class storage sy nologies.	ification of	storage a	ccordin
	Physical mass, put to power dimension Fuel cell Forms of Lecture,	basics of sele imped storage er and energy oning of storage I systems, stru	, superconducting y storage. Appl ge systems. cture and classifi	g magne ication cation o	examp	rgy stora les of red techi	nge). Class storage sy nologies.	ification of	storage a	ccordin
4	Physical mass, put to power dimension Fuel cell Forms of Lecture,	basics of sele imped storage er and energy oning of storage I systems, stru teaching: seminar-base	, superconducting y storage. Appl ge systems. cture and classified teaching with each teaching with each teaching with each teach te	g magne ication cation o	examp	rgy stora les of red techi	nge). Class storage sy nologies.	ification of	storage a	ccordin
4	Physical mass, puto power dimension Fuel cell Forms of Lecture, Participat	basics of sele imped storage er and energy oning of storage I systems, stru teaching: seminar-base tion requiremen	, superconducting y storage. Appl ge systems. cture and classified teaching with etts:	g magne ication cation o	examp	rgy stora les of red techi	nge). Class storage sy nologies.	ification of	storage a	ccordin
4	Physical mass, put to power dimension of Fuel cell Forms of Lecture, Participat Formal: Content: Forms of	basics of selection requirement None assessment:	, superconducting y storage. Appl ge systems. cture and classifi d teaching with e tts: e	g magnetication cation c	etic ener examp of select	rgy stora les of red techn	age). Class storage sy nologies.	ification of	storage a	ccordir
5	Physical mass, put to power dimension of Fuel cell Forms of Lecture, Participat Formal: Content: Forms of Written of Forms of For	basics of selection ped storage er and energy oning of storage laystems, structured teaching: seminar-base tion requirement None assessment: or oral examin	, superconducting y storage. Appl ge systems. cture and classifi d teaching with e tts: e e nation; in each ca	g magnetication cation c	etic ener examp of select	rgy stora les of red techn	age). Class storage sy nologies.	ification of	storage a	ccordi
5	Physical mass, put to power dimension of Fuel cell forms of Lecture, Participate Formal: Content: Forms of Written of Prerequise	basics of sele imped storage er and energy oning of storage I systems, stru teaching: seminar-base tion requiremen None assessment: or oral examin ite for the awar	, superconducting y storage. Appl ge systems. cture and classifi d teaching with e tts: e e nation; in each ca d of credit points:	g magnetication cation	etic ener examp of select	rgy stora les of red techn	age). Class storage sy nologies.	ification of	storage a	ccordin
4 5 6	Physical mass, put to power dimension of the cell forms of the cell forms of the content: Module of the content of the con	basics of sele imped storage er and energy oning of storage I systems, stru teaching: seminar-base tion requiremen None assessment: or oral examination p	d teaching with e ts: e e e nation; in each ca d of credit points: bass and course as	g magnetication cation	etic ener examp of select s and pr	rgy stora les of red techn ractical c	age). Class storage sy nologies.	ification of	storage a	ccordin
4 5 5	Physical mass, put to power dimension of Fuel cells Forms of Lecture, Participate Formal: Content: Forms of Written of Prerequise Module Application	basics of selection requirement of oral examination proof of the module	d teaching with e tts: e e nation; in each ca d of credit points: pass and course as le (in the following	g magnetication cation	etic ener examp of select s and pr prelimi	rgy stora les of eed techn actical c	age). Class storage synologies.	ification of	storage a	ccordin
5 6 7 8 8	Physical mass, put to power dimension of Fuel cells Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequis Module Application Electrical	basics of selection requirement assessment: or oral examination proof of the modulal Engineering	d teaching with e tts: e e nation; in each ca d of credit points: bass and course as le (in the following g B.Eng. and Rene	g magnetication cation	etic ener examp of select s and pr prelimi	rgy stora les of eed techn actical c	age). Class storage synologies.	ification of	storage a	ccordin
5 7 3	Physical mass, put to power dimension of Fuel cell forms of Lecture, Participate Formal: Content: Forms of Written of Written of Applicating Electrical Important	basics of selection ped storage er and energy oning of storage er and energy oning of storage er and energy oning of storage examinar-base tion requirement. None assessment: or oral examination proposed for the awar examination proposed for the modulal Engineering ce of the grade.	d teaching with e tts: e e nation; in each ca d of credit points: pass and course as le (in the following	g magnetication cation	etic ener examp of select s and pr prelimi	rgy stora les of eed techn actical c	age). Class storage synologies.	ification of	storage a	ccordi
7	Physical mass, put to power dimension of Fuel cell forms of Lecture, Participate Formal: Content: Forms of Written of Written of Application Electrical Important according for the properties of the properties o	basics of selection ped storage er and energy oning of storage er and energy oning of storage er and energy oning of storage examinar-base examinar-base examination proposed for the awar examination proposed examination proposed examination grade er and engineering er of the grade er and engineering to BRPO	d teaching with e tts: e e nation; in each ca d of credit points: bass and course as le (in the following g B.Eng. and Rene	g magnetication cation	etic ener examp of select s and pr prelimi	rgy stora les of eed techn actical c	age). Class storage synologies.	ification of	storage a	ccordi
4	Physical mass, put to power dimension of Fuel cell forms of Lecture, Participate Formal: Content: Forms of Written of Written of Prerequise Module Application Electrical Important accordined Module of the Present of	basics of selection ped storage er and energy oning of storage er and energy oning of storage er and energy on storage er and energy on storage examinar-base tion requirement. None assessment: or oral examination proportion of the awar examination proportion of the modulal Engineering ce of the grade ag to BRPO coordinator:	d teaching with e ts: e e e nation; in each ca d of credit points: bass and course as le (in the following g B.Eng. and Rene for the final grade:	g magnetication cation	etic ener examp of select s and pr prelimi	rgy stora les of eed techn actical c	age). Class storage synologies.	ification of	storage a	ccordi
14 55 77 38	Physical mass, put to power dimension of the cell forms of the cell forms of the content: Forms of the content of	basics of selection and energy oning of storage of systems, structured in the systems in the system in the s	d teaching with e ts: e e e nation; in each ca d of credit points: bass and course as le (in the following g B.Eng. and Rene for the final grade:	g magnetication cation	etic ener examp of select s and pr prelimi	rgy stora les of eed techn actical c	age). Class storage synologies.	ification of	storage a	ccordi
77	Physical mass, put to power dimension of the cell forms of the cell forms of the content forms of the content forms of the center forms of the cen	basics of selection and energy oning of storage or and energy oning of storage of systems, structured in the seminar-base of the same of the same of the modulation of the modulation of the grade of th	, superconducting y storage. Appl ge systems. cture and classified teaching with eduction to the description of the following g.B.Eng. and Renefor the final grade:	g magnetication cation	etic energie examp of select s and pr prelimi ent rogramn Energie	rgy stora les of eed techn actical c nary exa	age). Class storage synologies.	ification of	storage a	ccordi
77 33 30 10	Physical mass, put to power dimension of the cell forms of the cell forms of the content forms of the content forms of the center forms of the cen	basics of selection ped storage er and energy oning of storage er and energy oning of storage er and energy oning of storage er and energy on a systems, structured examination per examination per examination per on of the modulal Engineering ce of the grade er and the engineering er of the grade er and the engineering e	d teaching with e ts: e e e nation; in each ca d of credit points: bass and course as le (in the following g B.Eng. and Rene for the final grade:	g magnetication cation	etic energie examp of select s and pr prelimi ent rogramn Energie	rgy stora les of eed techn actical c nary exa	age). Class storage synologies.	ification of	storage a	ccord

Elec	trical Macl	nines								EM									
dent numl	ification per:	Worklo	oad:	Credits:	Study semester:			Frequency of the offer		Duration:									
1059)			5		3rd or 5th semester		Annual (Winter)		1 semester									
1	Course:		Pl	Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study									
	Lecture		60	60 students		2	SCH	30	h	45	h								
	Tuition in	seminar	s 30	students		1	SCH	15	h	22.5	h								
	Exercise		20) students		0	SCH	0	h	0	h								
	Practical	or semina		students		1	SCH	15	h	22.5	h								
	Supervise) students		0	SCH	0	h	0	h								
	•					Ů		Ů											
2	_		s/competen	ces:															
	Students			,		1 4		.•		1									
				ematical de inter diagrar			_				•								
				_						u transio	imers								
	 carry out the design of electrical machines for more complex drive systems recognise the steady-state and dynamic relationships between the electrical, chemical, magnetic 																		
	and mechanical quantities																		
	and modument quantities																		
	G · ·																		
3	Contents:				. C . 1 4 .	1	.1.1												
	- Motor and generator properties of electrical machines																		
	- Direct current machines, transformers, three-phase machines, linear motors																		
	- Modern control and regulation methods for electrical machines Small and special motors for precision engineering and information technology																		
	- Small and special motors for precision engineering and information technology																		
	Laboratory exercises:																		
	- Measurement of the characteristics of a DC machine																		
	- Short-circuit and no-load measurement of a transformer																		
	- Measurement of the characteristics of a three-phase asynchronous machine																		
4	Forms of teaching:																		
	Lecture,	seminar	-based tea	ching and la	aborator	y exerc	ises in si	mall group	s (3–4 part	icipants)									
	D																		
5	Participation requirements: Formal: None																		
	Content:			es of electric	ol ongir	nooring	should h	ovo boon s	u.cooccfulls	, complet	ad								
	Content.		THE Dasic	es of electric	ai engn	iccinig	Siloulu II	iave been s	uccessium	Complet	eu								
6	Forms of	assessme	ent:																
	Written examination or oral examination																		
7	_			credit points:															
	Module examination pass and course assessment Application of the module (in the following study programmes)																		
8																			
0	Electrical Engineering B.Eng. and Renewable Energies B.Eng. Importance of the grade for the final grade:																		
9	according to BRPO																		
	Module coordinator:																		
	Prof. Dr. Ing. habil. Klaus Hofer																		
10	Prof. Dr.	Ing. hal	bil. Klaus	потег						Other information:									
				noier															
10	Other info	ormation:		ed at the beg	ginning	of the c	ourse.												

	and safety of electrical equipment
12	Language:
	German

	ctromagneti	c Compatibili	ty						EMC	
Iden num	tification ber:	Workload:	Credits:	Study	semest	er:	Frequency	of the	Duratio	n:
106	2	150 h	5	6th sem.			Annual (Winter)		1 semester	
1	Course:		Planned group s	sizes	Scope	e	Actual of / classro teaching		Self-study	
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
	of the typ	pical protectiv	e basic coupling re measures. The of the tests. The	y know t	he mea	suring ed	quipment	required fo	r EMC tes	sts and th
3	Contents:									
	 Principles Coupling modes and Maxwell's equations Shielding and filter Legal requirements 									
	ShieldLegal	ing and filter requirements	d Maxwell's equa		ical					
4	ShieldLegalMeasuForms of	ing and filter requirements trement method teaching:	ods, theoretical a	nd pract						
	ShieldLegalMeasuForms ofLecture,	ing and filter requirements trement method teaching: seminar-base	ods, theoretical a	nd pract						
4 5	ShieldLegalMeasuForms ofLecture,Participat	ing and filter requirements trement methot teaching: seminar-base ion requiremen	ods, theoretical add teaching and pots:	nd pract						
	ShieldLegalMeasuForms of Lecture,ParticipatFormal:	ing and filter requirements trement method teaching: seminar-based ion requirementon None	ods, theoretical and teaching and pots:	nd pract						
5	 Shield Legal Measu Forms of Lecture, Participat Formal: Content: 	ing and filter requirements arement method teaching: seminar-based ion requiremen None Metr	ods, theoretical add teaching and pots:	nd pract						
	 Shield Legal Measu Forms of Lecture, Participat Formal: Content: Forms of 	ing and filter requirements arement method teaching: seminar-based ion requiremen None Metrossessment:	ods, theoretical and teaching and puts: e cology (1169)	nd pract						
5	• Shield • Legal • Measu Forms of Lecture, Participat Formal: Content: Forms of Written of	ing and filter requirements arement method teaching: seminar-based ion requiremen None Metropy assessment: examination of	ods, theoretical and teaching and pots: e cology (1169) or oral examination	nd pract						
5	 Shield Legal Measu Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequise 	ing and filter requirements rement method teaching: seminar-based ion requirement Mone Metropolitic for the awarding of the for the awarding and filter requirements.	ods, theoretical and parts: e cology (1169) or oral examination of credit points:	nd pract	course					
5 6 7	 Shield Legal Measu Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequisis Module of 	ing and filter requirements trement method teaching: seminar-based ion requirement None Metr assessment: examination of ite for the awar examination p	ods, theoretical and pets: e rology (1169) or oral examination of credit points: bass and course a	on assessme	nt					
5	 Shield Legal Measure Forms of Lecture, Participate Formal: Content: Forms of Written of Prerequise Module of Application 	ing and filter requirements trement method teaching: seminar-based ion requirement Mone Metrological Metrolog	ods, theoretical and teaching and posts: electrology (1169) or oral examination of credit points: coass and course and	on assessme	nt	nes)				
5 6 7 8	• Shield • Legal • Measu Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequisi Module of Application	ing and filter requirements arement method teaching: seminar-based ion requirement Monda Metropole assessment: examination of the for the aware examination point of the modulal Engineering	ods, theoretical and teaching and protests: e cology (1169) or oral examination of credit points: coass and course a le (in the following B.Eng.	on assessme g study pr	nt	nes)				
5 6 7	• Shield • Legal • Measure Forms of Lecture, Participate Formal: Content: Forms of Written of Prerequise Module of Application Electrical Importance	ing and filter requirements arement method teaching: seminar-based ion requiremen None None Metropy assessment: examination of the for the aware examination proposed for the grade of t	ods, theoretical and teaching and posts: electrology (1169) or oral examination of credit points: coass and course and	on assessme g study pr	nt	nes)				
5 6 7 8	Shield Legal Measure Forms of Lecture, Participate Formal: Content: Forms of Written of Prerequise Module of Application Electrical Important according	ing and filter requirements rement method teaching: seminar-based ion requirement Metron assessment: examination of ite for the aware examination proof the modulal Engineering to BRPO	ods, theoretical and teaching and protests: e cology (1169) or oral examination of credit points: coass and course a le (in the following B.Eng.	on assessme g study pr	nt	nes)				
5 6 7 8	Shield Legal Measure Forms of Lecture, Participate Formal: Content: Forms of Written of Prerequise Module of Application Electrical Important accordin Module of	ing and filter requirements rement method teaching: seminar-based ion requirement. None Metropy assessment: examination of the for the aware examination point of the modulal Engineering to Grand to BRPO coordinator:	ods, theoretical and teaching and pots: e rology (1169) or oral examination of credit points: bass and course and le (in the following B.Eng. for the final grade:	on assessme g study pr	nt	nes)				
5 6 7 8 9	Shield Legal Measure Forms of Lecture, Participate Formal: Content: Forms of Written of Prerequise Module of Application Electrical Important accordin Module of Prof. Dr.	ing and filter requirements rement method teaching: seminar-based ion requirement Money Metropole Metropol	ods, theoretical and teaching and protests: e cology (1169) or oral examination of credit points: coass and course a le (in the following B.Eng.	on assessme g study pr	nt	nes)				
5 6 7 8	Shield Legal Measure Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequis: Module of Application Electrical Important accordin Module of Prof. Dr. Other info	ing and filter requirements arement method teaching: seminar-based ion requirement Mone Metrological Metrolog	ods, theoretical and teaching and pots: e rology (1169) or oral examination of credit points: bass and course and le (in the following B.Eng. for the final grade:	on ussessme g study pr	nt rogramn					
5 6 7 8 9	Shield Legal Measure Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequis: Module of Application Electrical Important accordin Module of Prof. Dr. Other info	ing and filter requirements rement method teaching: seminar-based ion requirement Metron assessment: examination of the for the aware examination proposed of the grade of the	ods, theoretical and teaching and pots: e cology (1169) or oral examination of credit points: bass and course and course and course and course and course for the final grade: Westerwalbeslo	on ussessme g study pr	nt rogramn					

Elec	tronics 1									EL1	
Ident	tification	Worklo	oad:	Credits:	Study	semes	ter:	Frequency offer	of the	Duratio	on:
1066		150 h		5	2nd sem.			Annual (Summer)		1 semester	
1	Course:		F	Planned group sizes			e	Actual contact time / classroom teaching		Self-study	
	Lecture	Lecture		0 students		2 SCH		30	h	45	h
	Tuition in seminars			0 students		1	SCH	15	h	22.5	h
	Exercise		2	0 students		0	SCH	0	h	0	h
	Practical	or semina	ar 1	5 students		1	SCH	15	h	22.5	h
	Supervise	ed self-stu	idy 6	0 students		0	SCH	0	h	0	h
2	- El - Sk	nowledg odel des ectronic tills in b	e of the cription a circuit duilding a	physical pro and possible a imensioning and troubleshort c circuits of d	applicationskills stills ooting ele	ons of ectroni	discrete c circuit	diode and			c curves,
3	- Re - Vo - Vo Bipolar t - St - Vo - Oj - St - Do	nrameter coltage stoltage maransisto ructure, oltage stoperating ructure, C and A	abiliser valitiplier r: mode of abilisation point stamode of C voltage	ypes, models with Z-diode operation, typ n and constant bilisation and operation, typ e applications as switches i	pes, char nt curren l AC volt pes, char	acteris t sourc tage ar acteris	tic curve e with b nplifier i	es, model p ipolar tran Field effec es, model p	oarameters a sistor t transistor:		
4	Forms of Lecture,	seminar	, practica	ıl course							
5	Participat Formal:	ion requi	rements: None								
	Content:		None								
6	Forms of Written			n with prelim	inary ex	aminat	ion				
7	Prerequis	ite for the	e award of	credit points:							
8	Applicati	on of the	module (i	with preliming the following							
	Electrica										
9	Important accordin			the final grade:							
10	Module c	oordinate	or:								
11	Other info	ormation:									
	Literatur	e will be	e announ	ced at the beg	ginning o	f the c	ourse.				

12 Language:
German

	etronics 2									EL2	
	tification	Worklo	ad:	Credits:	Study	semest	er:	Frequency	y of the	Duratio	on:
num 106	aber: 8	150 h		5	3rd s	em.		Annual (Winter)		1 semester	
1	Course:		P	Planned group sizes		Scope		Actual of classro teaching		Self-study	
	Lecture		6	0 students		2 SCH		30	h	45	h
	Tuition in	Tuition in seminars		0 students		1	SCH	15	h	22.5	h
	Exercise		2	0 students		0	SCH	0	h	0	h
	Practical	or semina	r 1	5 students		1	SCH	15	h	22.5	h
	Supervise	ed self-stud	dy 6	0 students		0	SCH	0	h	0	h
3	- A	bility to in the competency of the control of the c	ndepend e to inde	al logic elem ently design ependently ur optimising el	and optim	mise eld	ectronic nction o	circuits of circuit d	esigns		
	- O	perationa	l amplifi and con	uit Technolog er (OPV) typ nplex feedbac filters	oes, struc			neters Basi	c OPV circ	uits	
	- A - Si - C Digital i - B - C	ntegrated asic build	erators ulation u circuit t ling bloc nilies and networks	using PSPICE echnology: ks of digital t I their parame	technolo	gy					
1	- A - Si - C Digital i - B - C - Sv - R	gnal gene ircuit sim ntegrated asic build ircuit fam witching i ear derail teaching:	erators ulation u circuit t ling bloc nilies and networks leurs	using PSPICE echnology: ks of digital to I their parame	technolo	gy					
	- A - Si - C Digital i - B - C - Sv - R Forms of Lecture, Participal	gnal gene ircuit sim ntegrated asic build ircuit fam witching rear derail teaching: seminar, tion requir	erators ulation u circuit t ling bloc tilies and networks leurs practica ements: None	using PSPICE echnology: ks of digital to I their parame	technolo	gy					
5	- A - Si - C Digital i - B - C - Sv - R Forms of Lecture, Participal Formal: Content:	gnal gene ircuit sim ntegrated asic build ircuit fam witching rear derail teaching: seminar, tion requir	erators ulation u circuit t ling bloc nilies and networks leurs practica ements: None None nt:	using PSPICE echnology: ks of digital of their parames	technolo eters		ion				
5	- A - Si - C Digital i - B - C - Sy - R Forms of Lecture, Participal Formal: Content: Forms of Written Prerequise	gnal gene ircuit sim ntegrated asic build ircuit fam witching rear derail teaching: seminar, tion require assessment examinat site for the	erators ulation u circuit t ling bloc nilies and networks leurs practica ements: None None nt: ion; eacl award of	asing PSPICE echnology: ks of digital all their parames I course	inary ex	aminati					
5 6 7	- A - Si - C Digital i - B - C - Si - R Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis Module Applicati	gnal generative incuit simmategrated asic build ircuit fammate witching rear derail teaching: seminar, tion requires examinate for the examination of the rearest size for the rearest size for the reamination of the rearest size for the reamination of the rearest size for the reamination of the rearest size for the rearest size for the rearest size for the reamination of the rearest size for the rearest si	erators ulation u circuit t ling bloc nilies and networks leurs practica ements: None None nt: ion; each award of ion pass nodule (i	l course n with prelimic credit points: with prelimin the following	inary exa	aminati	on				
4 5 7 8	- A - Si - C Digital i - B - C - Si - R Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis Module Applicati Electrical	gnal generative ircuit simmategrated asic build ircuit fammate witching rear derail teaching: seminar, tion requires examinate for the examinate on of the rail Engineer	erators ulation u circuit t ling bloc uliles and networks leurs practica ements: None None nt: ion; each award of ion pass module (i ering B.)	asing PSPICE echnology: ks of digital their parames I their parames a with prelimic credit points: with preliming the following Eng.	inary exa	aminati	on				
5 6 7	- A - Si - C Digital i - B - C - Si - R - R - Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis Module Applicati Electrica Importan	gnal gene ircuit sim ntegrated asic build ircuit fam witching rear derail teaching: seminar, tion require examinat ite for the examination of the rail Engine ce of the g	erators ulation u circuit t ling bloc nilies and networks leurs practica ements: None None nt: ion; each award of ion pass module (i ering B.J. rade for t	l course n with prelimic credit points: with prelimin the following	inary exa	aminati	on				
5 6 7 8	- A - Si - C Digital i - B - C - Sy - R Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis Module Applicati Electrica Importan accordin	gnal generative ircuit simmategrated asic build ircuit fammate witching rear derail teaching: seminar, tion requires examinate for the examinate on of the rail Engineer	practical ements: None None nt: ion; each award of ion pass module (i.ering B.I.erade for the O	n with preliming the following Eng.	inary exa	aminati	on				

ĺ		Literature will be announced at the beginning of the course.
	12	Language:
		German

	Electrical Engineering 1 ET1										
Identification number: Workload: Credits: Study semester: Frequency of the offer	Duration:										
	1 semester										
1 Course: Planned group sizes Scope Actual contact time / classroom teaching	Self-study										
Lecture 60 students 2 SCH 30 h 44	45	h									
	22.5	h									
Exercise 20 students 0 SCH 0 h 0)	h									
Practical or seminar 15 students 1 SCH 15 h 22	22.5	h									
Supervised self-study 60 students 0 SCH 0 h 0)	h									
2 Learning outcomes/competences:											
After completing the module, students will be able to:											
- name the basic electrotechnical parameters											
- name and apply the different calculation methods of linear DC networks	:41- 41										
 describe and mathematically analyse electric flow fields and electrostatic fields wirespective parameters 	vitn the										
respective parameters											
3 Contents:											
- Basic physical terms in electrical engineering											
- Conduction mechanisms											
- Linear direct current networks and their calculation methods											
- The steady-state electric flow field											
- The electrostatic field / the capacitor											
- Three laboratory practicals in small groups											
4 Forms of teaching:											
Lecture, seminar-based teaching, laboratory practicals											
5 Participation requirements:											
Formal: None											
Content: None											
6 Forms of assessment:											
Written examination; each with preliminary examination											
Prerequisite for the award of credit points: Module evening tion page with preliminary eveningtion											
Module examination pass with preliminary examination 8 Application of the module (in the following study programmes)											
Electrical Engineering B.Eng.											
9 Importance of the grade for the final grade:											
according to BRPO											
10 Module coordinator:											
Prof. DrIng. Rüdiger Schultheis											
Other information:											
Literature will be announced at the beginning of the course.											
12 Language: German											

Elec	trical Engi	neering 2							ET2	
Ident	tification ber:	Workload:	Credits:	Study	y semes	ter:	Frequency of the offer		Duration:	
1075	5	150 h	2nd	2nd sem.			Annual (Summer)		ester	
1	Course:		Planned group s	sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
	- nam	e parameters of	nodule, students of the magnetic nethods nating current ci	field as	well as	describe			-	_
3	Contents:									
	The stati	c magnetic fie	eld							
		varying mag								
			's equations, the	flow lav	v, the i	nduction	law/indu	ctance		
			ory: Parameters		,					
		ion of comple								
	If necess	ary. Multipha	se systems							
4	Forms of		1. 1. 11		1					
-		ion requirement	d teaching, labor	atory pr	acticais	3				
5	Formal:	None								
	Content:	None								
6		assessment:								
U			each with prelim	inary ev	aminat	ion				
7			d of credit points:	mary CA	amma	1011				
,	_		ass with prelimi	narv exa	minati	on				
8			e (in the following							
-		l Engineering		J F						
9	Importance	ce of the grade f	for the final grade:							
		g to BRPO								
10		oordinator:								
		-Ing. Rüdiger	Schultheis							
11	Other info				0.1					
			unced at the beg	ginning	of the c	ourse.				
12	Language	:								
	German									

Elec	etric Tractio	on							ETR	
Iden num	tification ber:	Workload:	Credits:	Credits: Study		y semester:		Frequency of the offer		on:
107	8	150 h	5	4th seme	4th or 6th semester			?)	1 seme	ester
1	Course:		Planned group s	Planned group sizes		Scope		contact time com	Self-study	
	Lecture		60 students		2	2 SCH		h	45	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
	- lear - real	istically asses e enormous a	and the design of s the problems of dvantages and fut	f storing	electric	cal ener	gy		•	
	- Eco unit - Ene - Alte (sol - Use	ological consums and the definition of the defin	hicles with comb mption formula f nition of environ n mobile vehicles ons with hybrid of ergy-saving drivitions (ICE, Transi	For the ended the mentally so (electrodrives, for the style ing st	nergy de y friend ochemic uel cells	emand of ly mobical and i	lity nechanica aps and re	l storage)	-	
4		teaching: seminar-base	d teaching and la	borator	y exerci	ses in s	mall group	es (3–4 parti	cipants)	
5		tion requiremen								
	Formal:	Non								
	Content:		lules on Electrica successfully cor		nes (10:	59) and	Power Ele	ectrics (113	3) should	have
5		assessment:	combination exa	•	or oral	examir	nation			
7			d of credit points:	miatiOl	i oi oiai	CAMIIII	1411/11			
			pass and course a	ssessme	nt					
3			le (in the following			nes)				
	Electrica	al Engineering	B.Eng. and Ren	ewable			Ţ.			
9	_		for the final grade:							
10		g to BRPO								
	Module coordinator:									
10	Prof. Dr. Ing. habil. Klaus Hofer Other information:									
10			laus Hofer							

	Students must have sufficient knowledge and experience in the use and safety of electrical equipment
12	Language:
	German

Emb	edded Sys	tems								ESYS	
Ident numb	ification er:	Workload:		Credits:	Study	semeste	er:	Frequency of the offer		Duration:	
1079	1079 150 h			5	6th sem.			Annual (Summer)		1 semester	
1	Course:		Pla	anned group siz	tes Scope		Actual contact time / classroom teaching		Self-study		
	Lecture		60 students			2	SCH	30	h	45	h
	Tuition in	seminars	30	30 students		1	SCH	15	h	22.5	h
	Exercise		20	students		0	SCH	0	h	0	h
	Practical or seminar		15 students		1	SCH	15	h	22.5	h	
	Supervise	ed self-study	60	students		0	SCH	0	h	0	h

2 Learning outcomes/competences:

Students:

- name and explain the different hardware concepts on which common embedded systems are
- explain the underlying hardware technologies, name advantages and disadvantages and evaluate the applicability for various practical problems.
- implement combinatorial and sequential function blocks in a synthesis language (e.g. VHDL) and use common toolchains to bring the synthesised functions to a target hardware (e.g. FPGA).
- develop a complex logic component according to specifications based on the previously developed function modules.
- evaluate algorithms with regard to their implementability in hardware or software (hardware/software co-design).
- explain design concepts for the hardware-related processing of discrete and continuous signals.
- distinguish the parallel design of algorithms for the hardware synthesis from conventional programming.
- compare their synthesis results with those of the other students and discuss differences in small groups.

3 Contents:

- Introduction to the topic of embedded systems (reactive, transforming systems, etc.)
- Classification of embedded hardware (microcontrollers, microprocessors, FPGAs, SoCs, etc.)
- Hardware technologies for the implementation of digital logic (SPLDs, CPLDs, FPGAs, ASICs)
- Repetition of combinatorial and sequential logic (pipelining etc.)
- Concepts of reliability, efficiency, hard and soft real time
- Hardware description languages (synthesis languages such as VHDL, VERILOG) compared to programming languages
- Introduction to VHDL
- Implementation of combinatorial and sequential logic components such as adders, multiplexers, automata, etc. in VHDL and their synthesis for an FPGA
- Synchronisation of the communication of asynchronous systems (one-synchronisation, metastability)
- Implementation of simple bus systems
- Aspects of hardware/software co-design

	- Control of	mechatronic systems such as robots						
4	Forms of teaching	y; };						
	Lecture, semina	r-based teaching, practical course						
5	Participation requ	irements:						
	Formal:	None						
	Content:	Basic knowledge in the fields of digital technology, programming and computer						
		architectures						
	Modules:							
	1045 Digital Electronics II;							
	1070 Digital Electronics I;							
		1104 Computer Science 1						
6	Forms of assessm	ent:						
	Written examin	ation, combination examination or oral examination						
7	_	ne award of credit points:						
	Module examin	ation pass and course assessment						
8	Application of the	e module (in the following study programmes)						
	Electrical Engir	neering B.Eng., Engineering Computer Sciences B.Eng, Mechatronics B.Sc. and						
		neering and Management B.Sc.						
9	_	grade for the final grade:						
	according to BF							
10	Module coordinat							
		t. Axel Schneider						
11	Other information	•						
	Literature will b	be announced at the beginning of the course.						
12	Language:							
	German							

	der and Di	wersity: Succe	ess Factors for Co		semes	er:	Frequency	of the	GUD	on.
numl		Workload.	Cicuits.	Study	semes	.01.	offer	of the	Duran	<i>J</i> 11.
3135	5	150 h	5	5 5th se			Annual (Winter)		1 semester	
1	Course:	I	Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study	
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in seminars		30 students		2	SCH	30	h	45	h
	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	Learning	outcomes/com	petences:		ų.		-!	-		
	•	Directive, Ge are sensitised independently business enviare able to incomministreamin practice. are familiar was management implementation	rinciples in the conneral Equal Treat to human heterogy recognise stereo	ement Acgeneity in a styping a ct releval an agement and a this, are	et) In the condition can Int information can Int approarable to	orporate develop rmation I to asses thes in the develop	context. ideas for on establishes their release the current conceptus	possible ch shed concep evance for p discourse cal ideas for	anges in ots such a profession divers	the as gende nal
3	 Contents: Definitions and delimitation of gender and diversity Concepts and approaches to equal opportunities (e.g. diversity management, gender mainstreaming) Legal bases and political influences (e.g. EU Anti-Discrimination Directive). General E Treatment Act (<i>German</i> abbreviation: AGG)) Subjective and social values, attitudes and prejudices in the context of diversity Possible approaches for taking diversity characteristics (e.g. gender and age) into accounselected areas of business (marketing, product development, human resources) Concept for the sustainable introduction of holistic diversity management Case studies and application examples from business practice 							al Equal		
	Forms of teaching:									
4	Forms of	teaching:								
1		_	ed teaching, prese	ntation,	group	work, pr	esentation	of seminar	paper	
	Lecture,	_		ntation,	group	work, pro	esentation	of seminar	paper	
4 5	Lecture,	seminar-base	nts:	ntation,	group	work, pro	esentation	of seminar	paper	

	Term paper, written examination, project work or oral examination
7	Prerequisite for the award of credit points:
	Module examination pass
8	Application of the module (in the following study programmes)
	Applied Mathematics B.Sc., Apparative Biotechnology 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

_	n-Frequenc	y Electronic	es						HFE	
Iden num	tification ber	Workload:	Credits:	Study	y semes	ter:	Frequency of the offer		Duration:	
1101		150 h	5	5 5th sen			Annual (Winter)		1 semester	
1	Course:		Planned group s	o sizes Scope			Actual of / classro teaching		Self-study	
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
	- nan com - sele the	ne, calculate apponents in A ect and apply measuremen	module, students and understand a AC and high-frequent the measurement at results produced the of wave matching	all commency tec t techniq	non fou hnolog jue for	ır-pole p y, determin	ning four-	pole param	eters and	evaluat
		zompon	ents of high-freque						~~~	
								1		
33	- The - wav - Sca - The - Cor	r-pole theory fory of lines we matching ttering parant Smith Char inponents of		ectronics						
	- Fou - The - wav - Sca - The - Cor - Lab	r-pole theory cory of lines we matching ttering parant Smith Char inponents of coratory prace teaching:	neters t high-frequency ele ticals in small grou	ectronics ups	3	uits				
4	- Fou - The - wav - Sca - The - Cor - Lab Forms of Lecture, Participal	or-pole theory fory of lines we matching ttering paran Smith Char mponents of foratory prac teaching: seminar-bas tion requirement	neters t high-frequency ele ticals in small grounds sed teaching, laborents:	ectronics ups	3	uits				
4	- Fou - The - wav - Sca - The - Cor - Lab Forms of Lecture,	or-pole theory cory of lines we matching ttering paran Smith Char inponents of coratory prace teaching: seminar-bas	neters t high-frequency ele ticals in small grounds sed teaching, laborents:	ectronics ups	3	uits				
4	- Fou - The - wav - Sca - The - Cor - Lab Forms of Lecture, Participal	r-pole theory of lines we matching ttering parameters of soratory practical teaching: seminar-base tion requirements of Ma	neters t high-frequency ele ticals in small grounds sed teaching, laborents:	ectronics ups ratory pra	acticals	s in smal	l groups.			
4 5	- Fou - The - way - Sca - The - Cor - Lab Forms of Lecture, Participar Formal: Content:	r-pole theory of lines we matching ttering param so Smith Charmponents of poratory practicaching: seminar-bastion requirements in No Ma Electrons in No Elect	neters t high-frequency electicals in small grounds sed teaching, laborents: ne uthematics 1 (1146 ectrical Engineerin	ectronics ups ratory pro- or 1147 g 1 (107	acticals 7) and 2 11 or 10	s in smal 2 (1152 c 072) and	l groups. or 1153). 2 (1075)			
4 5 6	- Fou - The - wav - Sca - The - Cor - Lab Forms of Lecture, Participal Formal: Content:	r-pole theory or or or or al example.	neters t high-frequency electricals in small grounds and teaching, labor ents: ne hthematics 1 (1146 extrical Engineerin	ectronics ups ratory pro- or 1147 g 1 (107	acticals 7) and 2 11 or 10	s in smal 2 (1152 c 072) and	l groups. or 1153). 2 (1075)		e	
3 4 5 7	- Fou - The - wav - Sca - The - Cor - Lab Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis	r-pole theory of lines we matching ttering parameters of something teaching: seminar-base teaching: seminar-base tion requirements of Ma Electron oral example of the award of the oral example of the award of the	neters t high-frequency electricals in small grounds in small grounds electricals in small grounds electrical thematics 1 (1146 electrical Engineerin lination; in each carard of credit points:	ectronics ups ratory pro- o or 1147 ug 1 (107	acticals 7) and 2 11 or 10 prelim	s in smal 2 (1152 c 072) and inary exa	l groups. or 1153). 2 (1075)		e	
4 5 6	- Fou - The - way - Sca - The - Cor - Lab Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis Module	r-pole theory of lines be matching ttering parameters of something teaching: Smith Charmponents of soratory prace teaching: Seminar-base too requirement of the parameters of the assessment: or oral examination	neters t high-frequency electricals in small grounds in small grounds electricals in small grounds electrical	ectronics ups ratory pro- 5 or 1147 g 1 (107 ase with	acticals //) and 2 // or 10 prelim uminati	s in smal 2 (1152 o 072) and inary exa	l groups. or 1153). 2 (1075)		e	
4 5 7 8	- Fou - The - way - Sca - The - Cor - Lab Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis Module Applicati Electrica	r-pole theory of lines by ematching ttering parameters of something teaching: Smith Charmponents of soratory prace teaching: seminar-basis tion requirements of managements of managements or oral examination on of the module Engineering teaching:	neters t high-frequency electricals in small grounds in small grounds ed teaching, labor ents: ne uthematics 1 (1146 extrical Engineerin ination; in each call and of credit points: pass with prelimination in the following B.Eng, Engineering B.Eng, Engineering	ectronics ups ratory pro- or 1147 ag 1 (107 ase with nary exa g study pro- pring Cor	acticals 2) and 2 1 or 10 prelim minati rogrami	s in smal 2 (1152 c 072) and inary exa on mes)	l groups. or 1153). 2 (1075) amination	performanc		с.
4 5 6	- Fou - The - way - Sca - The - Cor - Lab Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis Module Applicati Electrica Importan	r-pole theory of lines by ematching ttering parameters of something teaching: seminar-base tion requirements of Market M	neters t high-frequency electricals in small grounds and teaching, labor ents: ne ethematics 1 (1146 extrical Engineerin electrical Engineerin electrical ents: and of credit points: apass with prelimical electrical (in the following electrical).	ectronics ups ratory pro- or 1147 ag 1 (107 ase with nary exa g study pro- pring Cor	acticals 2) and 2 1 or 10 prelim minati rogrami	s in smal 2 (1152 c 072) and inary exa on mes)	l groups. or 1153). 2 (1075) amination	performanc		с.
4 5 7 8	- Fou - The - way - Sca - The - Cor - Lab Forms of Lecture, Participar Formal: Content: Forms of Written Prerequis Module Applicati Electrica Importan accordin	r-pole theory of lines by ematching ttering parameters of something teaching: seminar-based teaching:	neters t high-frequency electricals in small grounds in small grounds ed teaching, labor ents: ne uthematics 1 (1146 extrical Engineerin ination; in each call and of credit points: pass with prelimination in the following B.Eng, Engineering B.Eng, Engineering	ectronics ups ratory pro- or 1147 ag 1 (107 ase with nary exa g study pro- pring Cor	acticals 2) and 2 1 or 10 prelim minati rogrami	s in smal 2 (1152 c 072) and inary exa on mes)	l groups. or 1153). 2 (1075) amination	performanc		c.

11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

	puter Scie	ence 1							INF1			
Ident	ification	Workload:	Credits:	Study	semester:		Frequency of the offer		Duration:			
1104		150 h	5	1st se	em.		Annual (Winter)		1 sem.			
1	Course:		Planned group s	roup sizes Scope		e	Actual of / classro teaching		Self-stud	ly		
	Lecture		60 students		2	SCH	30	h	45	h		
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h		
	Exercise		20 students		0	SCH	0	h	0	h		
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h		
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h		
2	Learning	outcomes/comp	petences:		<u> </u>	1	1	_		-		
	- The	students nam	e the contents of	the basic	cs of c	omputer	science ar	d can expla	ain them.			
	- In p	particular, they aller problems.	are able to appl	ly the me	ethods	of struct	ured prog	ramming to	practice			
	- The	ey can safely u	se functions from	n the C s	tandar	d library	, e.g. for r	eading and	writing fi	iles.		
			ools of an integra						mpiler, li	inker and		
			n and create sim									
			ester, they design									
			e specification or rnet about altern									
			ow students to so			present	ine resurts	iii a siioit i	ecture am	u Evaiuai		
		01 111011 1011	o w state into to se									
	C											
3	Contents	Contents:										
	- Basic structure, function and mode of operation (binary number operations) of a digital computer,											
		ic structure, fu		e of opera	ation (1	oinary nu	ımber ope	rations) of a	digital c	omputer,		
	- Bas	ic structure, fu	nming in C++,	•		·	-		ı digital c	omputer,		
	- Bas	ic structure, fuics of program ensive use of the	nming in C++, ne tools of an int	•		·	-		ı digital c	omputer,		
	- Bas - Inte - Sim	ic structure, fuics of program ensive use of the ple and comp	nming in C++, ne tools of an intellex data types,	•		·	-		ı digital c	omputer,		
	- Bas - Inte - Sim - Mo	ic structure, fuics of program ensive use of the apple and compi dularisation of	nming in C++, ne tools of an int lex data types, F programmes,	egrated d	leveloj	oment en	vironmen	,	ı digital c	omputer,		
	- Bas - Inte - Sim - Mo - Ele	ic structure, fuics of program ensive use of the apple and composition of dularisation of mentary exam	nming in C++, ne tools of an int lex data types, Eprogrammes, ples of simple an	egrated of	leveloj	oment en	vironment	,	ı digital c	omputer,		
	- Bas - Inte - Sim - Mo - Ele	ic structure, fuics of program ensive use of the apple and composition of dularisation of mentary exam	nming in C++, ne tools of an int lex data types, F programmes,	egrated of	leveloj	oment en	vironment	,	ı digital c	omputer,		
	- Bas - Inte - Sim - Mo - Ele	ic structure, fuics of program ensive use of the apple and composition of dularisation of mentary exam	nming in C++, ne tools of an int lex data types, Eprogrammes, ples of simple an	egrated of	leveloj	oment en	vironment	,	ı digital c	omputer,		
	- Bas - Inte - Sim - Mo - Ele	ic structure, fuics of program ensive use of the apple and composition of dularisation of mentary exam	nming in C++, ne tools of an int lex data types, Eprogrammes, ples of simple an	egrated of	leveloj	oment en	vironment	,	a digital c	omputer,		
	- Bas - Inte - Sim - Mo - Ele	ic structure, fuics of program ensive use of the apple and composition of dularisation of mentary exam	nming in C++, ne tools of an int lex data types, Eprogrammes, ples of simple an	egrated of	leveloj	oment en	vironment	,	ı digital c	omputer,		
4	- Bas - Inte - Sim - Mo - Ele Discussi	ic structure, fuics of program ensive use of the apple and composition of dularisation of mentary exam- tion, analysis and	nming in C++, ne tools of an int lex data types, Eprogrammes, ples of simple an	egrated of	leveloj	oment en	vironment	,	a digital c	omputer,		
4	- Bas - Inte - Sim - Mo - Ele Discussi	ic structure, fuics of program ensive use of the ple and composition of the dularisation of the mentary examinon, analysis at teaching:	nming in C++, ne tools of an intellex data types, Eprogrammes, ples of simple and and practical prog	egrated c	developex data	oment en a structur merous e	vironmentes and algorates and algorates.	orithms,				
4	- Bas - Inte - Sim - Mo - Ele Discussi	ic structure, fuics of program ensive use of the ple and composition of the dularisation of the mentary examinon, analysis at teaching:	nming in C++, ne tools of an int lex data types, Eprogrammes, ples of simple an	egrated c	developex data	oment en a structur merous e	vironmentes and algorates and algorates.	orithms,				
	- Bas - Inte - Sim - Mo - Ele Discussi	ic structure, fuics of program ensive use of the ple and composition of dularisation of mentary examion, analysis and teaching: seminar-based	nming in C++, ne tools of an intelex data types, reprogrammes, ples of simple ar nd practical prog	egrated c	developex data	oment en a structur merous e	vironmentes and algorates and algorates.	orithms,				
	- Bas - Inte - Sim - Mo - Ele Discussi	ic structure, fuics of program ensive use of the ple and composition of the dularisation of the mentary examinon, analysis at teaching:	nming in C++, ne tools of an interest data types, reprogrammes, ples of simple and practical programmed d teaching, proje	egrated c	developex data	oment en a structur merous e	vironmentes and algorates and algorates.	orithms,				
	- Bas - Inte - Sim - Mo - Ele Discussi	ic structure, fuics of program ensive use of the ple and composition of mentary examinan, analysis and teaching: seminar-bases	nming in C++, ne tools of an interest data types, F programmes, ples of simple and nd practical prog	egrated c	developex data	oment en a structur merous e	vironmentes and algorates and algorates.	orithms,				
5	- Bas - Inte - Sim - Mo - Ele Discussi Forms of Lecture, Participa Formal: Content:	ic structure, fuics of program ensive use of the ple and compidularisation of mentary examion, analysis and teaching: seminar-based tion requirementary examinar-based tion requirementary examinary exa	nming in C++, ne tools of an interest data types, F programmes, ples of simple and nd practical prog	egrated c	developex data	oment en a structur merous e	vironmentes and algorates and algorates.	orithms,				
5	- Bas - Inte - Sim - Mo - Ele Discussi Forms of Lecture, Participa Formal: Content: Forms of	ic structure, fuics of program ensive use of the ple and complete dularisation of mentary examinon, analysis and teaching: seminar-based tion requirement None assessment:	nming in C++, ne tools of an interest data types, E programmes, ples of simple are nd practical prog	egrated complete amming	ex data g of nu	oment en	res and algexamples.	nework of t	he interns			
5	- Bas - Inte - Sim - Mo - Ele Discussi Forms of Lecture, Participa Formal: Content: Forms of Written	ic structure, fuics of program ensive use of the ple and complete and	nming in C++, ne tools of an interest data types, F programmes, ples of simple and nd practical prog	egrated complete amming	ex data g of nu	oment en	res and algexamples.	nework of t	he interns			
4 5 5 7	- Bas - Inte - Sim - Mo - Ele Discussi Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis	ic structure, fuics of program ensive use of the ple and compidularisation of mentary examion, analysis and teaching: seminar-based ion requirement None assessment: or oral examinite for the awar	nming in C++, ne tools of an interpretation in the cools of an interpretation in each capacitation; in each capacitation in the cools of an interpretation in the cools of an in	egrated of and complete comple	ex data g of nu	ork with	res and algexamples.	nework of t	he interns			
5 6 7	- Bas - Inte - Sim - Mo - Ele Discussi Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module	ic structure, fuics of program ensive use of the ple and composite dularisation of mentary examion, analysis and teaching: seminar-based ion requirement None assessment: or oral examination programs of the awar examination programs.	nming in C++, ne tools of an interest data types, E programmes, ples of simple and nd practical programmed teaching, projects: e e nation; in each car d of credit points:	egrated of and complete and gramming examples and gramming examples are with particularly examples.	ex data g of nu roup w	ork with	res and algexamples.	nework of t	he interns			
5	- Bas - Inte - Sim - Mo - Ele Discussi Forms of Lecture, Participa Formal: Content: Forms of Written Prerequis Module Applicati	ic structure, fuics of program ensive use of the ple and composite dularisation of mentary examion, analysis and teaching: seminar-based ion requirement None assessment: or oral examination programs of the awar examination programs.	mming in C++, ne tools of an interest data types, E programmes, ples of simple are nd practical programmed deteaching, projects: e e e e e e e e e e e e e e e e e e e	egrated of and complete and gramming examples and gramming examples are with particularly examples.	ex data g of nu roup w	ork with	res and algexamples.	nework of t	he interns			

	according to BRPO
10	Module coordinator:
	Prof. DrIng. Lutz Grünwoldt
11	Other information:
	Literature will be announced at the beginning of the course. Script will be
	provided.
12	Language:
	German

Com	puter Scie	nce 2							INF2	
	tification Workload:		: Credits:	Study	semest	er:	Frequency	of the	Duratio	n:
1108		150 h	5	2nd s	em.		Annual (Summer)		1 semester	
1	Course:		Planned group s	Planned group sizes		e	Actual contact time / classroom teaching		Self-study	
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition ir	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
3	Contents: - Con - Disc - Inte - Buil	nd of the ser raphical us course. The acepts of ob- cussion of a nsive use o	poply these confident mester, the students her interface using the ley discuss and evaluation of the pject-oriented programmerous elementary of the tools of an interest of the tools of an interest of the tools of the tools of the tools of an interest of the tools o	develop C# in pa luate the amming ry examp egrated c ships and	and pr rtner w solution (OOP) bles fro develop	and the oment er	e a themati I present it eir fellow s ir impleme ology and avironment	ntation usi	ng C#,	ork of the
			d error handling and gramming of graphi							
4	Forms of Lecture,	_	ased teaching, proje	ct and gr	oup w	ork with	in the fram	nework of t	he interns	
	Lecture,	seminar-ba		ct and gr	oup w	ork with	in the fram	nework of t	he interns	
5	Lecture, Participat	seminar-ba	nents:	ct and gr	oup w	ork with	in the fram	nework of t	he interns	
	Lecture,	seminar-ba		sics of pi			in the fram	nework of t	he interns	
	Participat Formal: Content:	ion requiren N K M 11 assessment:	nents: one nowledge of the bas odules: 104 Computer Scier	sics of pr	ogram	ming				
5	Participat Formal: Content: Forms of Written	seminar-batterion requiren N K M 11 assessment: or oral example.	nents: one nowledge of the bas fodules: 104 Computer Scier mination; in each ca	sics of pr	ogram	ming				
5	Participat Formal: Content: Forms of Written Prerequis	ion requiren N K M 11 assessment: or oral examite for the av	nents: one nowledge of the bas odules: 104 Computer Scier	sics of proce 1	ogram	ming nary exa				
5	Participat Formal: Content: Forms of Written Prerequis Module Applicati	ion requiren N K M 11 assessment: or oral examinatio on of the mo	nents: one nowledge of the bas fodules: 104 Computer Scier mination; in each ca ward of credit points: n pass with prelimination of the following	sics of proce 1 ase with process	rogram	ming nary exa				
5 6 7 8	Participat Formal: Content: Forms of Written of Prerequis Module Applicati Electrica	ion requiren N K M 11 assessment: or oral examinatio on of the month of the mo	nents: one nowledge of the base fodules: 104 Computer Scier mination; in each case ward of credit points: n pass with preliminate of the following ing B.Eng.	sics of proce 1 ase with process and process are sized as the process	rogram	ming nary exa				
5 6 7	Participat Formal: Content: Forms of Written Prerequis Module Applicati Electrica Importance	ion requiren N K M 11 assessment: or oral examinatio on of the month of the month of the grant of the gr	nents: one nowledge of the base fodules: 104 Computer Scier mination; in each case ward of credit points: n pass with preliminate base with preliminate base of the following base of the final grade:	sics of proce 1 ase with process and process are sized as the process	rogram	ming nary exa				
5 6 7 8	Participat Formal: Content: Forms of Written of Prerequis Module Applicati Electrica Important accordin	ion requiren N K M 11 assessment: or oral examinatio on of the month of the mo	nents: one nowledge of the base fodules: 104 Computer Scier mination; in each case ward of credit points: n pass with preliminate base with preliminate base of the following base of the final grade:	sics of proce 1 ase with process and process are sized as the process	rogram	ming nary exa				

11	Other information:
	Literature will be announced at the beginning of the course. A script will be
	provided.
12	Language:
	German

Inte	lligent Sen	sor bystems								
	tification	Workload:	Credits:	Study	semest	er:	Frequency of the offer		Duratio	on:
num 131		150 h	5	6th s	em.		Annual (Summer)		1 semester	
1	Course:		Planned group s	Planned group sizes Scope		/	ontact time	Self-stuc	ly	
	T .		60 . 1 .		1	COLL		m teaching	4.5	٠,
	Lecture	n seminars	60 students 30 students		2	SCH SCH	30	h h	45	h h
	1 uition ii	n seminars	50 students		1	зсп	15	III	22.5	l II
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Superviso	ed self-study	60 students		0	SCH	0	h	0	h
	Learning outcomes/competences: In relation to the contents listed below, the components of mechatronic systems. They caproduction processes in a targeted manner, a products. They confidently apply the necessar essential step in overall system design. The sthe field of sensor technology to design intefields of application in the area of moder methodology.				n select d desig means udents igent s	and co on and d and me use the ensor sy	nfigure ser evelop ser ethods of de basic know stems. Th	nsors suitab sors releva escribing so vledge of s ey analyse	ole for me ant for me ensor syst ignal pro trends an	echatron echatron tems as cessing nd curre
3	Contents									
3	Contents Sensors: Definition applicat: Sensor s Signal p theorem Sensor s Sensor s window Construct Integrati FPGA),	con of terms, of terms, of terms, of terms, or or consignal chain: processing and signal process error correctioning, design arction of technion levels, into connectivity/	categorisation acc haracterisation (a d conditioning, de ing: on, discrete-time p and implementation ical sensor system elligent sensors, in network connection ology and applica	sign and processing of digitals: and rect/von	resolute realisate realisa	tion, ser ation of a alogue a	chnologies asitivity, lin analogue fi	nearity) lters, ADU ectral analy	J/DAU, sa rsis/FFT,	ampling
3	Contents Sensors: Definition applicate Sensors: Signal p theorem Sensors: Sensors: Window Construct Integrati FPGA), Develop	cions, sensor cosignal chain: processing and signal processerror corrections, design arction of technion levels, into connectivity/pment method	haracterisation (a d conditioning, de ing: on, discrete-time p nd implementation ical sensor system elligent sensors, in the twork connection ology and applica	sign and processin n of digi ns: ndirect/v on ntions	resoluter realisation of an tal filter rirtual se	tion, ser	chnologies asitivity, lin analogue fi signals, spe aspects of e	nearity) Iters, ADU ectral analy mbedded s	J/DAU, sa rsis/FFT,	ampling
4	Contents Sensors: Definition applicate Sensor s Signal p theorem Sensor s Sensor s window Construct Integrati FPGA), Develop Forms of Lecture,	con of terms, or ions, sensor congral chain: processing and signal process error correction, design arction of technic connectivity/pment method	haracterisation (a d conditioning, de ing: on, discrete-time p and implementation ical sensor system elligent sensors, in network connection ology and applicated	sign and processin n of digi ns: ndirect/v on ntions	resoluter realisation of an tal filter rirtual se	tion, ser	chnologies asitivity, lin analogue fi signals, spe aspects of e	nearity) Iters, ADU ectral analy mbedded s	J/DAU, sa rsis/FFT,	ampling
4	Contents Sensors: Definition applicate Sensors Signal p theorem Sensors Sensors window Construe Integrate FPGA), Develop Forms of Lecture, Participa	cions, sensor cosignal chain: processing and signal processerror corrections, design arction of technion levels, into connectivity/pment method	haracterisation (a d conditioning, de ing: on, discrete-time p and implementation ical sensor system elligent sensors, in network connection ology and applicated	sign and processin n of digi ns: ndirect/v on ntions	resoluter realisation of an tal filter rirtual se	tion, ser	chnologies asitivity, lin analogue fi signals, spe aspects of e	nearity) Iters, ADU ectral analy mbedded s	J/DAU, sa rsis/FFT,	ampling
	Contents Sensors: Definition applicate Sensor s Signal p theorem Sensor s Sensor s window Construct Integrati FPGA), Develop Forms of Lecture,	con of terms, or consignal chain: processing and signal process error corrections, design arction of technical connectivity/pment method for teaching: Seminar-base tion requirement method signal process for corrections and technical connectivity/pment method for teaching: Seminar-base tion requirement for teaching: Seminar-base tion requirement for the connectivity/pment method for teaching: Seminar-base tion requirement for the connectivity/pment method for the connectivity/pment method for teaching: Seminar-base tion requirement for the connectivity/pment method for the	haracterisation (a d conditioning, de ing: on, discrete-time p and implementation ical sensor system elligent sensors, in network connection ology and applicated	sign and processin of digins: ndirect/von ations compute g (1073 trial Engand 1069	resolution realisation realisa	tion, ser ation of a aalogue rs ensors, a ases, pra	chnologies asitivity, linanalogue finanalogue finanalo	nearity) Iters, ADU ectral analy mbedded s se 070 Engin t), Electron ciences, 10	eering Conics (1063)	ampling nC, DSF
4	Contents Sensors: Definition applicate Sensors: Signal period theorem Sensors: Sensors: Window Construct Integrati FPGA), Develop Forms of Lecture, Participa Formal: Content:	con of terms, or consignal chain: processing and signal process error corrections, design arction of technical connectivity/pment method for teaching: Seminar-base tion requirement method signal process for corrections and technical connectivity/pment method for teaching: Seminar-base tion requirement for teaching: Seminar-base tion requirement for the connectivity/pment method for teaching: Seminar-base tion requirement for the connectivity/pment method for the connectivity/pment method for teaching: Seminar-base tion requirement for the connectivity/pment method for the	haracterisation (a decing: on, discrete-time pand implementation ical sensor systemelligent sensors, interwork connection ology and applicated teaching with conts: etrical Engineerin ences, 1070 Indus chatronics. 1067 a	sign and processin of digins: ndirect/von ations compute g (1073 trial Engand 1069	resolution realisation realisa	tion, ser ation of a aalogue rs ensors, a ases, pra	chnologies asitivity, linanalogue finanalogue finanalo	nearity) Iters, ADU ectral analy mbedded s se 070 Engin t), Electron ciences, 10	eering Conics (1063)	ampling nC, DSI omputer

	Module examination pass and course assessment
8	Application of the module (in the following study programmes)
	Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng, Mechatronics B.Sc. and
	Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade:
	according to BRPO
10	Module coordinator:
	Prof. DrIng. Joachim Waßmuth
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

Coll	oquium								KOL	
Ident	ification per:	Workload:	Credits:	Study	y semes	ter:	Frequenc	y of the	Durati	on:
1290		90 h 3		6th seme				each semester		
1	Course:		Planned group s	Planned group sizes Scope		Actual / classro teaching		Self-stu	dy	
	Lecture		60 students		0	SCH	0	h	90	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
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
	thesis, it reference	s subject-rel	of orally presenting lated foundations its significance fo	, its int	erdisci	plinary	connection			
3	Contents:									
	- Disp		esis according to ne procedure in thesis	-		f the the	esis and the	e questions	that aros	e in the
4	Forms of	teaching:								
	Oral exa	mination for	the bachelor thesi	is						
5	Participati	ion requireme	nts:							
	Formal:	Nor	ne							
	Content:	Trea	atment of the back	nelor the	esis					
6		assessment:								
	Oral exa									
7	Prerequisi	te for the awa	rd of credit points:							
8	Applied Engineer Renewah	Mathematic ing Compu lle Energies	ule (in the following es B.Sc., Appar- ter Sciences B.F B.Eng. and Indust	ative B Eng., M trial Eng	iotechr Iechani	nology cal Eng	gineering	B.Eng., M	ngineerin lechatron	g B.Eng.,
9	_	ce of the grade g to BRPO	for the final grade:							
10	Module co	oordinator:								
		-Ing. Rüdige	r Schultheis							
11	Other info		ounced at the beg	ginning o	of the c	ourse.				
12	Language									
	German									

Powe	er Electron	ics								LE	
Ident	ification	Worklo	oad:	Credits:	Study	y semes	ter:	Frequency offer	of the	Duratio	on:
1138		150 h		5	5th s	em.		Annual (Winter)		1 seme	ester
1	Course:		Pl	Planned group sizes Scope		e	Actual c / classroot teaching		Self-study		
	Lecture		60) students		2	SCH	30	h	45	h
	Tuition in	seminars	30) students		1	SCH	15	h	22.5	h
	Ei		20) -tlt-		0	CCII	0	1-	0	1-
	Exercise Practical	or semina		students students		0	SCH SCH	15	h h	22.5	h h
						1		13		22.3	"
	Supervise	d self-stu	dy 60) students		0	SCH	0	h	0	h
2	Learning	outcomes	/competer	ices:			•				•
	Students	will be	able to								
3	Contents: - Functircircircircircircircircircircircircirci	ctional uits (W1 tifier, in ciencies, trol, pro	d power of wer balan principle , W3, B2 verter, con harmoni tection and	of commu, B6) nverter and focts (Fourier), ad cooling of ith IGBT free converters	rard to th stationles four-qua power of power of equency	e harm ss, line drant o calculatelectron conver	e-communications nic computer (space	onents	self-comm		
	sem - Inno and Labo 1. Comi 2. Line-	iconductovative from the decemple or the decem	tor chip (pleds of apartralised epracticals) aless converted pow	power electory population of nergy managereter circuit er converter erter circuit	power eigement	_					
4	Forms of			citci circuit							
•				aching and p	ractical	training	g in smal	ll groups (3	- 4 partici	pants)	
5	Participat	ion requi	rements:								
5	Formal:	ion requir	None								
	Content:			on Electrica		nes (10)59) and	Drive Tech	nnology (10	013) shou	ıld be
6	Forms of	assessme		ally complet	ted						
J				al examinati	on						
7				credit points:							
	Module 6	examina	tion pass	and course a	assessme						
8				the followin							
	Electrica B.Eng.	l Engine	ering B.F	Eng, Enginee	ering Co	mputer	Science	s B.Eng an	d Renewał	ole Energ	ies
9		ce of the	grade for th	ne final grade	:						

	according to BRPO
10	Module coordinator:
	Prof. Dr. Ing. habil. Klaus Hofer
11	Other information:
	Literature will be announced at the beginning of the course.
	Students must have sufficient knowledge and experience in the use and safety of electrical
	equipment.
	Renewable Energies study programme, specialisation in Energy Efficient Systems: Elective subject
12	Language:
	German

Math	nematics 1								MA1	
ldent numb	ification er:	Workload:	Credits:	Stud	ly semester:		Frequency of the offer		Duration:	
1146	j	240 h	8	1st s	em.		Annual (Winter)		1 sem	ester
L	Course:		Planned group s	Planned group sizes Scope		e	Actual of / classro teaching		Self-study	
	Lecture		60 students		4	SCH	60	h	100	h
	Tuition in	seminars	30 students		2	SCH	30	h	50	h
	Б .		20 1 1			COLL		1,	0	-
	Exercise	or seminar	20 students 15 students		0	SCH SCH	0	h h	0	h h
	Practical	or seminar	13 students		0	зсп	0	11	U	11
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
<u> </u>	Learning	outcomes/con	npetences:		_		-			
	linea - nam - worl - solv - grap - solv - calc - knov - repr repr solve line Contents: - Stets - Don	ar, quadratice the element with exponse equations of linear and e algebraic equate integrate with the basics esent straightesentation ear equation ear, subsets, on an and ranger enter the element of th	ot of function and planes of the function and planes of functions, the nents, polynomials (quadratic equation non-linear equations containing and are able to of linear algebra at lines and planes of systems by Gaustines of functions on stets (age of functions eries (arithmetic step).	onential eir propos s and rat ons) and on ng comp calculate in vector ssian elim number	and ot erties a ional e inequa blex fra e areas orial for mination	her funct nd are ab xpression lities ctions and lines rm and k	ion ble to outli ns s, now the d	ine them		
	trigo - Con - Solv - Con - Rier - Basi - Vec	onometric fu tinuity and c ving equation applex number mann integrations of linear tors, vectors	etions (linear, quac nctions) and illust differentiability of as and inequalities ers (Euler's formulal, partial integrational algebra spaces, bases and continuant, matrix repr	rations of function a and po on and s	or functions in or or functions in or	tions ne variab resentati tion forn lar produ	le on of com nula act, vector	plex numb	•	and
	- Linear	equations sy	ystems, Gaussian							
	Forms of									
	Lecture,	seminar ion requireme	ents:							
5	Formal:	No								
	Content:		od basic mathema	tical kno	owledg	e at Gerr	nan 'Fach	oberschulni	iveau' lev	el
5		assessment:	; each with prelim	ingra or	aminet	ion				
,			ard of credit points:	шагу ех	ammal	1011				
	- Lorequisi	ISI MIC WW	or erean points.							

8	Application of the module (in the following study programmes)
	Electrical Engineering B.Eng.
9	Importance of the grade for the final grade:
	according to BRPO
10	Module coordinator:
	Prof. DrIng. Martin Kohlhase
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

Matl	nematics 2									MA2	
Ident numl	rification per:	Workl	oad:	Credits:	Stud	y semest	er:	Frequency	y of the	Duration:	
1152	2	240 h		8	2nd	and sem.		Annual (Summer)		1 semester	
1	Course:			Planned group	sizes	Scope	e	Actual (Self-stud	ly
	Lecture			60 students		4	SCH	60	h	100	h
	Tuition in seminars		rs	30 students		2	SCH	30	h	50	h
	Exercise			20 students	dents		SCH	0	h	0	h
	Practical	or semin	ar	15 students		0	SCH	0	h	0	h
	Supervise	ed self-st	udy	60 students		0	SCH	0	h	0	h
3	- ap m - ou - se m - so - so - in Contents - Li - Ei - Fu - M - So - C	poply vecethod. Itline further up and ass. Island of the engineer of the engineer algorizations artial deficit up and assifications artial deficit up and lassifications of the engineer up and lassifications of the engine	nctions of l solve many diffi-order many	f different type matrices and so of two real variables integral problems in the erential equations of ordinary differential variables, especially graph volume, masserdinary differential equation (transforming expecially graph volume, masserdinary differential equation (transforming expecially graph volume, masserdinary differential equation in the expecial expecially graph with the expecial expecial expectation in the expectation in the expecial expectation in the	iables and a le form of the fo	ear equand have re able of ordinal are able tion using ential economic continuous difficultions unations unations	a view of to calcularly diffice to classing eigenquations and linear lynomia lity and ferential ty)	of function late area, vertical equation requation l, methods differential	ns of severa volume, cen quations. d eigenvect as systems s to diagona ability	l real vari atre of gra ors.	iables.
4	Forms of Lecture,	teaching	; :	,g		ir oquan	(0) 0.	01 01		<u>[uui:ui:s)</u>	
5	Participal Formal: Content:	tion requ	irements: None Module 1146 M	es: Iathematics 1							
6		examina	ation; eac	ch with prelim	inary ex	aminati	on				
7	_			of credit points: s with prelimi	nary exa	minatio	on				
,		on of the	module (in the following							
		al Enoin	eering R	.Eng.							
8	Electrica Importan	ce of the	grade for	the final grade:							
8	Electrica	ce of the g to BR coordinate	grade for PO or:	the final grade:	:						

Ī		Literature will be announced at the beginning of the course.
	12	Language:
		German

Mec	chatronics								ME		
Iden num	tification ber:	Workload:	Credits:	Study	semest	emester: Freq		Frequency of the		Duration:	
1164		150 h	5	6th se	em.		Annual (Summer)	1 seme	ester	
1	Course:		Planned group s	ned group sizes Scope		Actual c / classro teaching		Self-stud	ly		
	Lecture		60 students		2	SCH	30	h	45	h	
		n seminars	30 students		1	SCH	15	h	22.5	h	
Exercise Practical or semina			20 students		0	SCH	0	h	0	h	
		or seminar	15 students		1	SCH	15	h	22.5	h	
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h	
	Learning	outcomes/comp	petences:		1		1				
	paramete Determi	ers, analysis nation of harn	ur of machines a of vibration pronic oscillations	roblems,	deter	mination	n of poss	ible const			
3	the respector of the over Softward	ective operatin verall system. e tools: Matlab	nding of mechatr g conditions. Ab o, Simulink.	onic syst	ems. S	election and calc	of the sens	sors and act	namic pa	ramete	
3	Contents Example compone movement modes of magnetic	ective operating verall system. The tools: Matlable tools: Mat	nding of mechatr g conditions. Ab	Mimo systational retrime di escillators atural ose, piezo a	ystems gy co- novem agrams s: Equa cillatio	, identifinductors ents, mess. Descritors of ons. Serve mory me	ication of , energy echanical c ption of o motion, n o systems, etal actuate	Mimo sy conductors scillations. atural frequinverter drors, pneum	stems, mes for tra translation Fourier to uencies and ives, line	nechanic inslation ons, printransfor nd natur ar moto	
3	Contents Example componimoveme movers, One-mai modes o magnetic magneto	ective operating verall system. The tools: Matlah system is a tools: Matlah system is as a system is a system is as a system is a system is as a system is a	ronic systems, I ronic systems, I ronic systems, mechanic onductors for rothines, movement and three-mass o roperties of the national conductors, micromechalters, and micromechalters, micromechalters, micromechalters, micromechalters, micromechalters, micromechalters, and micromechalters, micro	Mimo systational retrime di scillators atural osa, piezo a anical sy	ystems gy comovemagrams: Equacillation and me	, identifinductors ents, mess. Descritors of ons. Serve mory me	ication of , energy echanical c ption of o motion, n o systems, etal actuate	Mimo sy conductors scillations. atural frequinverter drors, pneum	stems, mes for tra translation Fourier to uencies and ives, line	nechanic inslation ons, printransfor nd natur ar moto	
	Contents Example compone moveme movers, One-ma modes of magnetic magneto	ective operating verall system. The tools: Matlah system. The tools: Matlah system is a system of mechanisms and system of vibration. Proceedings of vibration. Procedings of vibration. Procedings of vibration. The control of vibration of vibration of vibration.	ronic systems, I ronic system, mechanic onductors for rothines, movement and three-mass of operties of the nation of the systems, micromechallogical systems,	Mimo systational retrime di scillators atural osa, piezo a anical sy	ystems gy comovemagrams: Equacillation and me	, identifinductors ents, mess. Descritors of ons. Serve mory me	ication of , energy echanical c ption of o motion, n o systems, etal actuate	Mimo sy conductors scillations. atural frequinverter drors, pneum	stems, mes for tra translation Fourier to uencies and ives, line	nechanio inslation ons, printransfor nd natu ar moto	
ļ	Contents Example compone moveme movers, One-ma modes of magnetic magneto	ective operating verall system. The tools: Matlah system is a tools: Matlah system is as a system is a system is as a system is a system is as a system is a	ronic systems, I ronic systems, I ronic systems, I ronductors for rothines, movement and three-mass of the national three-mass of the national three-mass of the rothines, movement and three-mass of the national three-mass of three-mass	Mimo systational retrime di scillators atural osa, piezo a anical sy	ystems gy comovemagrams: Equacillation and me	, identifinductors ents, mess. Descritors of ons. Serve mory me	ication of , energy echanical c ption of o motion, n o systems, etal actuate	Mimo sy conductors scillations. atural frequinverter drors, pneum	stems, mes for tra translation Fourier to uencies and ives, line	nechanionslations, printransfornd natural ar moto	
ļ	Contents Example compone moveme moveme modes o magnetic magneto Forms of Lecture, Participat	ective operating verall system. e tools: Matlah e tools: Matla	ronic systems, It is a condition of mechatring conditions. Abortonic systems, It is a conditional conductors for roth ines, movement and three-mass of operties of the moter motor drives, intors, micromechatric microm	Mimo systational retrime di scillators atural osa, piezo a anical sy	ystems gy comovemagrams: Equacillation and measterns	, identifinductors ents, mess. Descritors of ons. Serve mory me	ication of , energy echanical c ption of o motion, n o systems, etal actuate	Mimo sy conductors scillations. atural frequinverter drors, pneum	stems, mes for tra translation Fourier to uencies and ives, line	nechani inslatio ons, pri transfor nd natu ar moto	
ļ.	Contents Example componimoveme movers, One-maimodes o magnetic magneto Forms of Lecture, Participat Formal: Content:	ective operating verall system. The tools: Matlah system were tools: Matlah system. The tools: Matlah system were tools: M	ronic systems, I ronic systems, I ronic systems, mechanic ronductors for rothines, movement and three-mass or operties of the natural ronductors, micromechators, micromechato	Mimo systational retrime discillators atural osa anical sy	ystems gy comovemagrams: Equacillation and measterns	, identifinductors tents, mess. Descritations of the mory mess for actual	ication of , energy echanical coption of o motion, no systems, etal actuate actuate actuates and se	Mimo sy conductors converters, scillations. atural frequinverter drors, pneumensors.	stems, mes for tra fourier to translation Fourier to the translation ives, line atic, hydron	nechani inslatio ons, pri transfor nd natu ar moto raulic a	
ļ.	Contents Example componimoveme movers, One-mai modes o magnetic magneto Forms of Lecture, Participar Formal: Content: Forms of Written	ective operating verall system. The tools: Matlate	ronic systems, I ronic systems, I ronic systems, mechanic onductors for rothines, movement and three-mass of operties of the national three-mass of the national three rothines, micromechaltors,	Mimo systational retrime discillators atural osa anical sy	ystems gy comovemagrams: Equacillation and measterns	, identifinductors tents, mess. Descritations of the mory mess for actual	ication of , energy echanical coption of o motion, no systems, etal actuate actuate actuates and se	Mimo sy conductors converters, scillations. atural frequinverter drors, pneumensors.	stems, mes for tra fourier to translation Fourier to the translation ives, line atic, hydron	nechani inslatio ons, pri transfor nd natu ar moto raulic a	
j 5	Contents Example compone moveme movers, One-ma modes o magnetic magneto Forms of Lecture, Participal Formal: Content: Forms of Written Prerequise	ective operating verall system. The tools: Matlah verall system. The tools: Matlah verall system. The end of t	ronic systems, I ronic system, mechanic onductors for rothines, movement and three-mass of operties of the national systems, micromechal teaching, practites: d teaching, practites: e e combination example of credit points:	Mimo systal energational rettime di escillators atural ose, piezo a anical sy	ystems gy comovem agrams: Equacillation and measterns	, identifinductors tents, mess. Descritations of the mory mess for actual	ication of , energy echanical coption of o motion, no systems, etal actuate actuate actuates and se	Mimo sy conductors converters, scillations. atural frequinverter drors, pneumensors.	stems, mes for tra fourier to translation Fourier to the translation ives, line atic, hydron	nechani inslatio ons, pri transfor nd natu ar moto raulic a	
1	Contents Example compone moveme movers, One-ma modes o magneti magneto Forms of Lecture, Participal Formal: Content: Forms of Written Prerequis Module	ective operating verall system. The tools: Matlah verall systems, energy control working mackstypents, energy control working mackstyp	ronic systems, I ronic systems, I ronic systems, mechanic onductors for rothines, movement and three-mass of operties of the national three-mass of the national three rothines, micromechaltors,	Mimo systal energational rettime di escillators atural oscillators anical symiamination	ystems gy comovem agrams: Equacillation and measterns	, identifinductors sents, mess. Descriations of one actual	ication of , energy echanical coption of o motion, no systems, etal actuate actuate actuates and se	Mimo sy conductors converters, scillations. atural frequinverter drors, pneumensors.	stems, mes for tra fourier to translation Fourier to the translation ives, line atic, hydron	nechani inslatio ons, pri transfo nd natu ar moto raulic a	

9	Importance of the grade for the final grade:
	according to BRPO
10	Module coordinator:
	Prof. DrIng. Heinrich Kühlert
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

Mea	suring and	Testing Sys	tems						MPS			
Iden	tification ber:	Workload:	Credits:	Study	semest	ter:	Frequency offer	of the	Duratio	on:		
116	6	150 h	5	5th s	5th sem.		Annual (Summer	·)	1 seme	1 semester		
1	Course:		Planned group si	izes	Scop	e	Actual of / classro teaching		Self-stud	ly		
	Lecture		60 students		2	SCH	30	h	45	h		
	Tuition ir	n seminars	30 students		1	SCH	15	h	22.5	h		
	Exercise		20 students		0	SCH	0	h	0	h		
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h		
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h		
	environn	nent (LabVi	f digital signal pr ew) to develop a p and use them.		_		•	•	1 0			
3	Contents:											
	- Draft											
	- Digital measurement data acquisition											
	- Trigger functions											
	- Digital data processing											
	- Sequence control and process automation											
4	- Projec Forms of	t managemen	1t									
4			ed teaching, practi	cal com	rse							
5		ion requireme		cui coui								
	Formal:	No										
	Content:		dules: 9 Metrology									
6	Forms of	assessment:										
		mination										
7	_		ard of credit points:									
		examination				,						
8			ule (in the following	study pi	rogramn	nes)						
9		al Engineering ce of the grade	g B.Eng. e for the final grade:									
	accordin	g to BRPO										
10		oordinator:										
			s Westerwalbeslob	n								
11	Other info		nounced at the begi	inning o	of the c	ourse.						
12	Language): 										
	German											

Met	rology								MT	
Iden num	tification ber:	Workload:	Credits:	Study	y semest	er:	Frequency of the offer		Duratio	on:
116	9	150 h	5	3rd seme	or ester	5th	Annual (Winter)		1 sem	ester
1	Course:		Planned group s	sizes	Scope)	Actual c / classro teaching		Self-stu	dy
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition ir	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervised self-study		60 students		0	SCH	0	h	0	h
	After con a measur	mpleting the r	I measuring instrumedule, they will perform the meanalysis.	be able	to select	a devic	e suitable f	or a meas	urement ta	ask, desigi
3	Contents:									
	Basics	s, basic circui	ts							
			nechanical measu	iring ins	trument	ts				
	• Error	calculation an	d causes of meas	suremen	t deviati	ions				
			ectrical quantities amic behaviour o		ring sys	tems				
4	Forms of	teaching:								
			d teaching and pr	ractical	course					
5		ion requiremen	its:							
	Formal:	none								
			lules:		_					
		1075	Electrical Engir	neering 2	<i></i> _					
	Content:									
6		assessment:	1 1.1 11	•						
7			each with prelimed of credit points:	ınary ex	amınati	on				
7	•		a of credit points: bass with prelimi	naru ove	minatio	'n				
8			le (in the following							
U			g B.Eng, Enginee	• •	-		s B.Eng an	d Renewa	ble Enero	ies
	B.Eng.	2.1.5.110011118	, 2.2, 2	5 00	pater		. D.Ling un	a rene wa	ore Energ	
9		ce of the grade	for the final grade:							
	accordin	g to BRPO								
10		oordinator:								
			Westerwalbeslo	h						
11	Other info				C .1					
10			ounced at the beg	ginning	of the co	ourse.				
12	Language									
	German									

Mic	rocontrolle	ers							MC	
Iden	tification ber	Workload:	Credits:	Study	y semest	er:	Frequency offer	of the	Duration:	
117		150 h	5	5th s	sem.		Annual (Winter)		1 semester	
1	Course:		Planned group s	Planned group sizes		e	Actual c / classro teaching		Self-stud	ly
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students	20 students		SCH	0	h	0	h
	Practical or seminar		15 students		1	SCH	15	h	22.5	h
	Superviso	ed self-study	60 students		0	SCH	0	h	0	h
3	help of i	modern develop	devices. They a pment environm		nd debi	ig the s	oftware or	the target	hardware	e with th
	Structur Comma Introduc Program Solution	Contents: Overview and comparison of type families. Structure and mode of operation of a microcontroller using the example of a current 8-bit controller. Command set and on-chip peripherals, connection of external peripherals. Introduction to machine language and assemblers. Programming in C. Solution of frequently occurring tasks in consideration of the technical and economic aspects.								
4	Lecture	•	e with blackboa	rd writii	ng and p	orojectio	on, accomp	anying sen	ninar. Pra	ctical
5	_	n the laboratory tion requirement								
J	Formal:		J.							
	Content:	Scien 1068) Modu 1045 1070 1325	ules Digital Electors. 1070 and 10 should have be ules: Digital Electror Digital Electror Electrical Engir	045) or even compairs II; nics I;	electron pleted.			_	-	-
6		assessment:			1!			uC		
7	Prerequis	site for the award	ation; in each call of credit points:				amination j	performanc	e	
8			ass with preliming (in the following							
	Electrica	al Engineering	B.Eng. and Eng	ineering			ences B.En	g		
a	Importance of the grade for the final grade:									
9	accordin	ng to BRPO	C							

	Prof. DrIng. Thomas Hesse
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

IVIIC	rosystems	Гесhnology							MST									
Iden num	tification ber:	Workload:	Credits:	Study	semest	er:	Frequenc offer	y of the	Duration:									
117	4	150 h	5	4th seme	or 6th ster		Annual (Summer)		1 semester									
1	Course:		Planned group s	izes	Scope	e	Actual contact time / classroom teaching		Self-study									
	Lecture		60 students		2	SCH	30	h	45	h								
	Tuition in	seminars	30 students		0	SCH	0	h	0	h								
	Exercise		20 students		0	SCH	0	h	0	h								
	-	or seminar	15 students		2	SCH	30	h	45	h								
	Supervise	d self-study	60 students		0	SCH	0	h	0	h								
2	-	outcomes/comp		technolo	ogies of	microe	lectronics	and micros	vstems									
	 Knowledge of the materials and technologies of microelectronics and microsystems technology 																	
	- Knowledge of the main fields of application in sensor and actuator technology																	
	- Capabilities for systematising data sheet information of micro-electromechanical systems																	
	(MEMS)																	
	- Knowledge of system integration of MEMS																	
	- Knowledge of system integration of MEMS - Knowledge and skills in the simulation techniques																	
	- Practical competence in the realisation of sensor systems with MEMS																	
3	Contents:																	
	1. Materials and technologies of microsystems engineering and microelectronics																	
		2. Sensors																
	3. Actua																	
		4. System integration 5. Simulation																
4	Forms of																	
		practicals																
-		ion requiremen	ts:															
5	Formal:	None																
)	Content:																	
5	Forms of	assessment:																
6	Written e	examination of	Written examination or combination examination; each with preliminary examination performance															
			or combination ca															
5	_		d of credit points:							Module examination pass with preliminary examination								
6	Module	examination p	d of credit points: bass with prelimin	nary exa														
6 7	Module of Application	examination pon of the modu	d of credit points: bass with preliming the (in the following	nary exa	ogramn	nes)												
5 7 8	Module of Application Electrica	examination properties on of the module. I Engineering	d of credit points: pass with preliming le (in the following g B.Eng. and Engi	nary exa study pr	ogramn	nes)	ences B.E	ng										
5 7 3	Module of Application Electrical Important	examination pon of the modu I Engineering to of the grade	d of credit points: bass with preliming the (in the following	nary exa study pr	ogramn	nes)	ences B.E	ng										
6 7 8	Module of Application Electrical Important according	examination pon of the modu I Engineering the of the grade g to BRPO	d of credit points: pass with preliming le (in the following g B.Eng. and Engi	nary exa study pr	ogramn	nes)	ences B.E	ng										
7 7 8	Module of Application Electrica Important accordin Module c	examination pon of the modulation of the modulation of the grade of the grade of the BRPO coordinator:	d of credit points: bass with preliming le (in the following g B.Eng. and Enging for the final grade:	nary exa study pr	ogramn	nes)	ences B.E	ng										
66 77 88 99	Module of Application Electrical Important accordin Module of Prof. Dr.	examination pon of the modulation of the modulation of the grade of the grade of the BRPO coordinator: Ing. Dirk Zie	d of credit points: bass with preliming le (in the following g B.Eng. and Enging for the final grade:	nary exa study pr	ogramn	nes)	ences B.E	ng										
	Module of Application Electrical Important accordin Module of Prof. Dr. Other info	examination point of the modulation of the modulation of the grade of the grade of the BRPO coordinator: Ing. Dirk Zienmation:	d of credit points: bass with preliming the (in the following B.Eng. and Enging for the final grade: elke	nary exa study pr ineering	ogramn Compi	nes) uter Scie	ences B.E	ng										
66 77 88 99 110	Module of Application Electrical Important accordin Module of Prof. Dr. Other info	examination pon of the modulation of the modulation of the grade of the grade of the grade ordinator: Ing. Dirk Zielermation: e will be annoted	d of credit points: bass with preliming le (in the following g B.Eng. and Enging for the final grade:	nary exa study pr ineering	ogramn Compi	nes) uter Scie	ences B.E	ng										
7 3	Module of Application Electrical Important accordin Module of Prof. Dr. Other info	examination pon of the modulation of the modulation of the grade of the grade of the grade ordinator: Ing. Dirk Zielermation: e will be annoted	d of credit points: bass with preliming the (in the following B.Eng. and Enging for the final grade: elke	nary exa study pr ineering	ogramn Compi	nes) uter Scie	ences B.E	ng										

. 1011	works and	Bus Systems							NBS								
ldent numl	ification per:	Workload:	Credits:	Stud	y semes	ter:	Frequenc offer	ey of the	Durati	on:							
1180)	150 h	5	5th	sem.		Annual (Winter)		1 semester								
1	Course:		Planned group s	sizes	Scop	e	Actual / classr teachin		Self-stu	dy							
	Lecture		60 students	60 students		SCH	30	h	45	h							
		n seminars	30 students		2 2	SCH	30	h	45	h							
	Exercise		20 students		0	SCH	0	h	0	h							
	Practical	or seminar	15 students		0	SCH	0	h	0	h							
	Supervise	ed self-	60 students		0	SCH	0	h	0	h							
3	Contents:																
	 Transmission media, data backup and coding, bus access procedures Real-time capability Classic fieldbus systems, especially CANopen, PROFIBUS and LON Ethernet and TCP/IP protocols, Ethernet-based fieldbus systems, especially POWERLINK, Ether-CAT, PROFINET and TSN OPC-UA 																
<u> </u>	Forms of	teaching:															
	Lectures	s, exercises, p															
5		tion requireme															
	Formal:	Nor Nor															
ó		assessment:	IC														
			examination, comb	bination	exami	nation or	oral exa	mination									
	Module	examination															
	~ ~		ule (in the following B.Eng. and Eng		-		ences B.E	ng									
			for the final grade: or SPO if ungraded		e subje	ect											
	Module o																
0	Prof. Dr	coordinator:	ıs Bünte				Prof. DrIng. Andreas Bünte										
		coordinator:	as Bünte														
0	Other inf	coordinator:Ing. Andreacormation: re will be ann	as Bünte	ginning	of the c	ourse.											

Netw	ork Tech	nology							NW	
Identification Workload:		Workload:	Credits:	Study	semes	ter:	Frequency	y of the	Duratio	on:
1181		150 h	5	3rd seme	or ster	5th	Annual (Winter)		1 semester	
1	Course:	.I	Planned group s	sizes	Scop	e	Actual of / classro teaching		Self-stud	ly
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
	set PC)	them up in the and discuss the students assign	asic knowledge of e laboratory with the results of their gn the processes and eliminate con	a partner r work. in an IP	er, cont	figure that	le network	devices use	ed (route	r, switc
	- Stud	dents are fami lents name pos	liar with the role	of a swi	tch and	d configu	ure virtual	LANs (VL	AN).	
	Contents - Arc - Me - Loc - Sub - Pro - Fun - Cor - App - Sim	chitecture and dia for data tracal networks and tocols of data action of imponfiguration of plication and proposed and pro	liar with the role ssibilities to proto application of co	mputer-a ristics, le subnet networks upling de its for set tocols,	nided control length (netwo	ommuni	attacks. Acation sys M), transport l lly router,	tems,	AN).	
	Contents - Arc - Me - Loc - Sub - Pro - Fun - Cor - App - Sim	chitecture and dia for data tracal networks and tocols of data action of imponfiguration of plication and professional pro	application of coansmission, and their character also with variable transmission in retant network coactive components services and pro-	mputer-a ristics, le subnet networks upling de tts for set tocols, ion of co	aided content length (netwo	ommuni oms (VLS) ork and to especial onetwork	ication sys M), transport l lly router, rks,	tems, ayer), switch),		ship
1	Contents - Arc - Me - Loc - Sub - Pro - Fun - Cor - App - Sim Forms of Lecture, Participal	chitecture and dia for data tracal networks an action of important and production are production are production and production are production are production are production and production are production	application of consmission, and their character also with variable transmission in retant network conactive component services and protectical constructed deaching, projects:	mputer-a ristics, le subnet networks upling de tts for set tocols, ion of co	aided content length (netwo	ommuni oms (VLS) ork and to especial onetwork	ication sys M), transport l lly router, rks,	tems, ayer), switch),		ship
4	Contents - Arc - Me - Loc - Sub - Pro - Fun - Cor - App - Sim Forms of Lecture, Participal Formal: Content:	chitecture and dia for data tracal networks and tocols of data action of importation and production and production and production and production requirement None None None	application of consmission, and their character also with variable transmission in retant network conactive component services and protectical constructed deaching, projects:	mputer-a ristics, le subnet networks upling de tts for set tocols, ion of co	aided content length (netwo	ommuni oms (VLS) ork and to especial onetwork	ication sys M), transport l lly router, rks,	tems, ayer), switch),		ship
4	Contents - Arc - Mee - Loc - Sub - Pro - Fun - Cor - App - Sim Forms of Lecture, Participal Formal: Content: Forms of	chitecture and dia for data tracal networks and action of importation level nulation and professional seminar-base tion requirement None assessment:	application of consmission, and their character also with variable transmission in retant network conactive component services and protectical constructed deaching, projects:	mputer-a ristics, le subner networks upling de tocols, con of co	aided control length (networker) coup w	ommunions (VLS) ork and to network with	ication sys M), transport I lly router, rks, rks.	tems, ayer), switch),	he intern	ship
5	Contents - Arc - Mee - Loc - Sub - Pro - Fun - Cor - App - Sim Forms of Lecture, Participal Formal: Content: Forms of Written examina	chitecture and dia for data tracal networks an enterior formation tocols of data action of important in the	application of consmission, and their character also with variable transmission in retant network conscribes and propactical constructed deaching, projects:	mputer-a ristics, le subner networks upling de tocols, con of co	aided control length (networker) coup w	ommunions (VLS) ork and to network with	ication sys M), transport I lly router, rks, rks.	tems, ayer), switch),	he intern	ship
3 3 5 6	Contents - Arc - Mee - Loc - Sub - Pro - Fun - Cor - App - Sim Forms of Lecture, Participal Formal: Content: Forms of Written examina Prerequis	chitecture and dia for data tracal networks an enterior formation tocols of data action of important in the	application of consmission, and their character also with variable transmission in retant network conservices and propactical construct deteaching, projects:	mputer-a ristics, le subner networks upling de its for ser tocols, cion of co	nided contained the length (networker) the le	ommunions (VLS) ork and to network with	ication sys M), transport I lly router, rks, rks.	tems, ayer), switch),	he intern	ship
5 5 7	Contents - Arc - Med - Loc - Sub - Pro - Fun - Cor - App - Sim Forms of Lecture, Participal Formal: Content: Forms of Written examina Prerequis Module	chitecture and dia for data tracal networks and tocols of data action of important in a manner of the calculation and professional event in the calculation requirement in the calculation performant in the calculation in the calculat	application of consmission, and their character also with variable transmission in retant network conactive components services and protractical constructed deaching, projects: e e combination example defected to force the combination example describes with prelimination to the services with prelimination to the services with prelimination example.	mputer-a ristics, le subnet networks upling de ts for set tocols, ion of co	nided contained the length (networker) and the length (networker) and the length (networker) are tring upomputed to or or a mination or or or or a mination or	ommunions (VLS) ork and to especial point with	ication sys M), transport I lly router, rks, rks.	tems, ayer), switch),	he intern	ship
5	Contents - Arc - Med - Loc - Sub - Pro - Fun - Cor - App - Sim Forms of Lecture, Participal Formal: Content: Forms of Written examina Prerequis Module Applicati	chitecture and dia for data tracal networks and networks and tocols of data action of importation level nulation and professional fraction of the nulation and professional fraction requirements assessment: None Non	application of consmission, and their character also with variable transmission in retant network conservices and propactical construct deteaching, projects:	mputer-a ristics, le subnet networks upling de tts for set tocols, tion of co	aided control length (networker) coup where the couple where t	ommunions (VLSI) ork and the content of the content	ication sys M), transport l lly router, ks, rks. in the fran	tems, ayer), switch), nework of the	he intern	

	according to BRPO
10	Module coordinator:
	Prof. DrIng. Lutz Grünwoldt
11	Other information:
	Literature will be announced at the beginning of the course. Lecture notes will be provided. Each student will be a member of a Cisco class and will have access to a simulation environment and extensive online curricula. Certificates can be issued for successful participation in Cisco final exams.
12	Language:
	German

Num	nerics for E	Electrical Eng	gineers						NFE	
Ident	ification	Workload:	Credits:	Study	semes	ter:	Frequency	y of the	Duratio	on:
1318		150 h	5	5 4th se			Annual (Summer	:)	1 semester	
1	Course:		Planned group s	Planned group sizes		e	Actual contact time / classroom teaching		Self-study	
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
3		ct, combine a	n assess the possib and adapt suitable					arcai metho	ous, evaiu	ate results
	numerica - Basics - Root-f - Large - Interpo - Regres - Nume - Nume	al analysis of of floating p inding algori linear/non-lin olation ssion rical differen rical methods	essential principl typical problems point arithmetic ithms near systems of ectiation and integra is for ordinary diff les from electrical	are expirations	lained	with exa		Standard t	echnique	s for the
4	Forms of	teaching:								
			ed teaching, pract	ical cour	rse					
5	-	ion requireme	nts:							
	Formal:									
	Content:	114	dules: 6 Mathematics 1; 2 Mathematics 2							
6		assessment: examination								
7	Prerequis	ite for the awa	ard of credit points:							
,	Module examination pass Application of the module (in the following study programmes)									
8	Electrical Engineering B.Eng. Importance of the grade for the final grade:									
	Electrica Importan	ce of the grade								
9	Electrica Important accordin	ce of the grade g to BRPO								
8	Electrica Importan- accordin Module c	ce of the grade	e for the final grade:							
9	Electrica Important accordin Module c Prof. Dr Other infe	ce of the grade g to BRPO oordinator: . rer. nat. Lar ormation:	e for the final grade:		of the c	ourse.				

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T	ല	rr	n	я	n

Opto	oelectronic	es							OPT	
den	tification ber:	Workload:	Credits:	Study	semes	ter:	Frequenc	y of the	Duration:	
1190		150 h	5 5th se		em.		Annual (Winter)		1 semester	
1	Course:	1	Planned group s	sizes	Scop	e	Actual / classro teaching		Self-stud	ły
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
		or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
2	Learning	outcomes/com	petences:							
3	Contents - Phy - Sen - Rac pho - Rac	ecomponents as exical principle niconductor ediation detect todiodes, pho liation emittin	es of the properti- lectronics: Funda ors: thermal de totransistors, CC ag devices: Lumin sion technology v	es of light mentals tectors, D device nescent of	ht and and in quantes, CM diodes,	propagat teraction um dete OS sens laser dio	tion of electrons (e.gors, etc.)	ctromagneti	c waves	
4 5	Lecture,	teaching: seminar-base	ed teaching and parts:	ractical t	trainin	g in smal	ll groups (2–4 particip	vants)	
	Formal:					•	1.1	11 -	11	1
	Content:	Mod 1066 1067 1073	c physics and electules: 6 Electronics 1; 8 Electronics 2; 1 Electrical Engir 5 Electrical Engir 9 Metrology;	neering 1	l;	ring moo	aules, as v	vell as those	isted be	·low:

	1105 Di' 1.	
	1195 Physics 1;	
	1200 Physics 2	
6	Forms of assessment:	
	Oral examination; in each case with preliminary examination	
7	Prerequisite for the award of credit points:	
	Module examination pass with preliminary examination	
8	Application of the module (in the following study programmes)	
	Electrical Engineering B.Eng. and Engineering Computer Sciences B.Eng	
9	Importance of the grade for the final grade:	
	according to BRPO	
10	0 Module coordinator:	
	Prof. Dr. rer. nat. Sonja Schöning	
11	1 Other information:	
	Literature will be announced at the beginning of the course. Students must have sufficient knowledge and experience in the use and saf	ety of electrical equipment
	Students must have sufficient knowledge and experience in the use and sar	ety of electrical equipment
12	2 Language:	
	German	

ruot	ovoltaic S	ystems							PVA		
	ification	Workload:	Credits:	Study	y semes	ter:	Frequency	of the	Durati	on:	
numb 1289		150 h	5	5th semester An			offer Annual (Winter)		1 semester		
1	Course:		Planned group s	Planned group sizes		e	Actual contact time / classroom teaching		Self-study		
	Lecture		60 students		3	SCH	45	h	45	h	
		n seminars	30 students		1	SCH	15	h	45	h	
	Exercise		20 students		0	SCH	0	h	0	h	
	Practical	or seminar	15 students		0	SCH	0	h	0	h	
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h	
2	_	outcomes/com	-			1	ļ	ļ		<u> </u>	
			module, students					C1: 1 1	, .		
	-		physical relation	-			nversion o	f light to el	ectric cu	irrent,	
			e the potential of				a thain das	iam			
	- exp	iain the struct	ture of photovolta	ne syster	ms and	carcurat	e meir des	ign.			
_	Contents:										
3	Contents: The photoelectric effect, electrical description of PV systems, potential of solar radiation,										
3			ect, electrical desc	cription (of PV s	systems,	potential o	of solar radi	ation,		
3	The pho	toelectric effe	ect, electrical desc gn of PV systems				potential o	of solar radi	ation,		
3	The pho Construc	toelectric effection and desi		s, inverte	er techi	nology,	-		ation,		
3	The pho Construct MPP con	toelectric effection and desi	gn of PV systems	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
3	The pho Construct MPP con	toelectric effection and desi	gn of PV systems th considerations,	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
3	The pho Construct MPP con	toelectric effection and desi	gn of PV systems th considerations,	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
3	The pho Construct MPP con	toelectric effection and desi	gn of PV systems th considerations,	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
3	The pho Construct MPP con	toelectric effection and desi	gn of PV systems th considerations,	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
3	The pho Construct MPP con	toelectric effection and desi	gn of PV systems th considerations,	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
3	The pho Construct MPP con	toelectric effection and desi	gn of PV systems th considerations,	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
3	The pho Construct MPP con	toelectric effection and desi	gn of PV systems th considerations,	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
3	The pho Construct MPP con	toelectric effection and desi	gn of PV systems th considerations,	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
	The pho Construct MPP con PV syste	toelectric effection and desi ntrol mismate ems, tracked s	gn of PV systems th considerations,	s, inverte lightnin	er teching and f	nology, Fire prote	ection, wor	k on	ation,		
4	The pho Construct MPP con PV syste	toelectric effection and desintrol mismate ems, tracked s	gn of PV systems th considerations, systems, stand-alo	s, inverte lightnin one syste	er techning and f	nology, Fire prote id conne	ection, wor	k on	ation,		
4	The pho Construct MPP con PV syste	toelectric effection and desintrol mismatcems, tracked seems, tracked seems, tracked seems and exercises and exercise	gn of PV systems th considerations, systems, stand-alo	s, inverte lightnin one syste	er techning and f	nology, Fire prote id conne	ection, wor	k on	ation,		
	The pho Construct MPP con PV syste	toelectric effection and desintrol mismatcems, tracked seems, tracked seems, tracked seems and exercise and exercise toon requirement	gn of PV systems th considerations, systems, stand-alo	s, inverte lightnin one syste	er techning and f	nology, Fire prote id conne	ection, wor	k on	ation,		
4	Forms of Lectures Participal	toelectric effection and desintrol mismatcems, tracked seems, tracked seems, tracked seems, tracked seems and exercises and exercises the top of the toelectric effect of t	s or term papers on term.	or semin	er teching and fems, gr	entation	ection, wor	k on itions		71 1075	
4	The pho Construct MPP con PV syste	toelectric effection and desintrol mismatcems, tracked seems, trac	s or term papers onts: le sics 1 (1195), Ph	or semin	ar pres	entation	ection, wor	k on itions	d 2 (107		
4	Forms of Lectures Participal	toelectric effection and desintrol mismatcems, tracked seems, trac	s or term papers on term.	or semin	ar pres	entation	ection, wor	k on itions	d 2 (107		
4 5	Forms of Lectures Participal Formal:	toelectric effection and desintrol mismatcems, tracked seems, trac	s or term papers onts: le sics 1 (1195), Ph	or semin	ar pres	entation	ection, wor	k on itions	d 2 (107		
4	Forms of Lectures Participal Content:	teaching: and exercise ion requirement on Physical assessment: examination	s or term papers onts: le sics 1 (1195), Production to Electronical considerations, systems, stand-alors of the stand-alors of the stand-alors of the standard of the standar	or semin	ar pres	entation	ection, wor	k on itions	d 2 (107		
4 5	Forms of Lectures Participal Content: Forms of Written Prerequise	teaching: teaching: and exercise tion requirement Non Phy Intro assessment: examination ite for the awar	s or term papers on the side of the considerations, systems, stand-along the side of the considerations of the considerations of the consideration of the co	or semin	ar pres	entation	ection, wor	k on itions	d 2 (107		
4 5 7	Forms of Lectures Participat Forms of Written Prerequis Module	teaching: teaching: and exercise ion requirement Non Phy Intro assessment: examination ite for the awar examination	s or term papers on the solution to Electronal of credit points: pass and course a	or semin	er techning and frems, grams,	entation Electrication	ection, wor	k on itions	d 2 (107		
4 5 7	Forms of Lectures Participal Formal: Content: Forms of Written Prerequis Module Applicati	teaching: teaching: and exercise ion requirement Non Phy Intro assessment: examination ite for the awar examination on of the modu	s or term papers on the systems, stand-alors of term papers on the sice of the systems of the sy	or semin	er techning and frems, grams,	entation Electrication	ection, wor	k on itions	d 2 (107		
4 5 7 8	Forms of Lectures Participal Formal: Content: Forms of Written Prerequis Module Applicati Electrica	teaching: teaching: and exercise ion requirement Non Phy Intro assessment: examination ite for the awar examination on of the modulal Engineering	s or term papers on the considerations, systems, stand-alors of term papers on the constant of the considerations, and the considerations, and the considerations, and the considerations, and the constant of	or seminarysics 2 rical Povessessme	er techning and frems, grams,	entation Electrication	ection, wor	k on itions	d 2 (107		
5	Forms of Lectures Participat Formal: Content: Forms of Written Prerequis Module Applicati Electrica Importan	teaching: teaching: and exercise ion requirement Non Phy Intro assessment: examination ite for the awar examination on of the modulal Engineering ce of the grade	s or term papers on the systems, stand-alors of term papers on the sice of the systems of the sy	or seminarysics 2 rical Povessessme	er techning and frems, grams,	entation Electrication	ection, wor	k on itions	d 2 (107		
4 5 6 7 8	Forms of Lectures Participal Formal: Content: Forms of Written Prerequis Module Applicati Electrica Importan accordin	teaching: teaching: and exercise ion requirement Non Phy Intro assessment: examination ite for the awar examination on of the modu al Engineering ce of the grade grade to BRPO	s or term papers on the considerations, systems, stand-alors of term papers on the constant of the considerations, and the considerations, and the considerations, and the considerations, and the constant of	or seminarysics 2 rical Povessessme	er techning and frems, grams,	entation Electrication	ection, wor	k on itions	d 2 (107		
4 5 7 8	Forms of Lectures Participal Forms of Written Prerequis Module Applicati Electrica Importan accordin Module of	teaching: teaching: and exercise ion requirement Non Phy Intro assessment: examination ite for the awar examination on of the modulal Engineering ce of the grade	s or term papers on the solution to Electronal course and course a	or seminarysics 2 rical Povessessme	er techning and frems, grams,	entation Electrication	ection, wor	k on itions	d 2 (107		

	Schlabbach: Netzgekoppelte Photovoltaikanlagen, 2.Auflage, VDE-Verlag. Schlabbach: Netzanschluss erneuerbarer Energien, Schriften aus Lehre und Forschung der FH-Bielefeld Nr. 26. Further literature will be announced at the beginning of the course.
12	Language:
	German

Phys	sics 1								PH1	
	dentification Workload:		Credits:	Study	y semest	er:	Frequency	of the	Duratio	on:
num 119:		150 h	5	5 1st se			offer Annual (Winter)		1 semester	
1	Course:	·	Planned group s	Planned group sizes		e	Actual contact time / classroom teaching		Self-study	
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
2	The students of the students of the method is the method in the students of th	ental laws of a sequences of rall questions incomes can carry out hods of error	he structure and nature of classic mass points and s	al mech simple b aluate m easurem	anics. 7 podies. 7 neasurement res	They ca They rec ments ar	n analyse a cognise pro nd present	and mather oblem conte	matically exts and o clearly. T	describe can solve They know
3	MeasuBasicKinenDynan	cal quantities a arement accurate concepts of clustics: Descrip mics: Newton's	acy and measurer assical mechanic otion of motion s axioms laws of	motion						
3	PhysicMeastBasicKinenDynarWorkMoneRotati	cal quantities a urement accura concepts of cl natics: Descrip mics: Newton's and energy, co entum and coll ons and angul	acy and measurer assical mechanic otion of motion s axioms laws of onservation of en lisions ar momentum	motion						
3	- Physic - Measu - Basic - Kinen - Dynan - Work - Mome - Rotati - Basic Forms of Lecture, experim	cal quantities a urement accura concepts of cl natics: Descrip mics: Newton's and energy, co entum and coll ons and angul concepts of flat teaching: seminar with ents)	acy and measurer assical mechanic otion of motion s axioms laws of onservation of en lisions ar momentum uid mechanics	motion nergy		ic physic	cs practical	course – F	Part 1 (3	
4	- Physic - Measu - Basic - Kinen - Dynan - Work - Mome - Rotati - Basic Forms of Lecture, experim	cal quantities a prement accura- concepts of clausics: Descrip- mics: Newton's and energy, co- centum and coll- ons and angul- concepts of fluc- teaching: seminar with	acy and measurer assical mechanic otion of motion s axioms laws of conservation of er disions ar momentum uid mechanics practice-oriented tts:	motion nergy		ic physic	cs practical	course – F	Part 1 (3	
4	- Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content:	cal quantities a arement accura concepts of clustics: Descripmics: Newton's and energy, coentum and coll ons and angul concepts of flusteaching: a seminar with ents) tion requirement None assessment:	acy and measurer assical mechanic otion of motion s axioms laws of onservation of er lisions ar momentum uid mechanics practice-oriented ats:	motion nergy	ses, basi		cs practical	course – F	Part 1 (3	
5 6	- Physic - Meast - Basic - Kinen - Dynan - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequise	cal quantities a arement accura concepts of clustics: Descripmics: Newton's and energy, coentum and collons and angulaconcepts of flusteaching: a seminar with ents) tion requirement None Sassessment: examination; esite for the awar	acy and measurer assical mechanic otion of motion s axioms laws of conservation of er disions ar momentum uid mechanics practice-oriented tts:	motion nergy d exercis	ses, basi	ion	es practical	course – F	Part 1 (3	
5 6	- Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis Module Applicati	cal quantities a arement accura concepts of clustics: Descripmics: Newton's and energy, contum and coll ons and angul concepts of flustrations are with ents) I too requirement with ents and energy in the aware examination; of the moduli on process of contents of the moduli on the moduli o	acy and measurer assical mechanic otion of motion s axioms laws of onservation of er lisions ar momentum uid mechanics practice-oriented tts: e e each with prelim d of credit points:	motion nergy d exercis inary ex nary exa	ses, basi aminati aminatio	ion on nes)			Part 1 (3	
4 5 6 7 8	- Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis Module Applicati Electric: Importan	cal quantities a arement accura concepts of clustics: Descripmics: Newton's and energy, coentum and coll ons and angul concepts of flateaching: a seminar with ents) tion requirement None None assessment: examination; of the modulal Engineering ce of the grade	acy and measurer assical mechanic otion of motion s axioms laws of conservation of er disions ar momentum uid mechanics practice-oriented tts: e e each with prelimit d of credit points: coass with prelimit le (in the following	inary exa	ses, basi aminati aminatio	ion on nes)			Part 1 (3	
5 7	- Physic - Measu - Basic - Kinen - Dynan - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis Module Applicati Electricati Importan accordir Module of	cal quantities a arement accura concepts of clustics: Descripmics: Newton's and energy, contum and collons and angulaconcepts of flustrations and angulaconcepts of flustration requirement None None assessment: examination; aste for the awar examination proposed in the grade and to BRPO coordinator:	acy and measurer assical mechanical mechanical mechanics of motion of motion of axioms laws of conservation of entisions ar momentum uid mechanics practice-oriented tts: te e each with preliming of credit points: coass with preliming B.Eng. and Eng for the final grade:	inary exa	ses, basi aminati aminatio	ion on nes)			Part 1 (3	
5 6 7 8 9	- Physic - Measu - Basic - Kinen - Dynar - Work - Mome - Rotati - Basic Forms of Lecture, experim Participa Formal: Content: Forms of Written Prerequis Module Applicati Electrica Importan accordir Module of Prof. Dr	cal quantities a arement accura concepts of clustics: Descripmics: Newton's and energy, contum and coll ons and angul concepts of flateaching: seminar with ents) iton requirement None None assessment: examination; of the awar examination proportion of the modulate and the grade and to BRPO coordinator: rer. nat. Larsformation:	acy and measurer assical mechanical mechanical mechanics of motion of motion of axioms laws of conservation of entisions ar momentum uid mechanics practice-oriented tts: te e each with preliming of credit points: coass with preliming B.Eng. and Eng for the final grade:	inary exangstudy princering	amination	ion on nes) uter Scie			Part 1 (3	

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Larmon
German

	sics 2								PH2			
	lentification Workload:		: Credits:	Stud	y semest	er:	Frequency offer	of the	Duratio	n:		
1200		150 h	5	5 2nd s			Annual (Summer)		1 semester			
1	Course:		Planned group	Planned group sizes		e	Actual contact time / classroom teaching		Self-study			
	Lecture		60 students		2	SCH	30	h	45	h		
	Tuition is	n seminars	30 students		1	SCH	15	h	22.5	h		
	Exercise		20 students		0	SCH	0	h	0	h		
		or seminar	15 students		1	SCH	15	h	22.5	h		
		ed self-study outcomes/co	60 students		0	SCH	0	h	0	h		
	principle The stud	es to technic lents know apply it. Th	oscillations and weal problems and weal problems and weal problems and weal the scientific work ney have skills to pethe results.	ork out ing metl	solution nod witl	is indepoint in the alt	endently. ernating ef	fect of exp	eriment a	and theory		
3	pro - Osc - Wa	cesses illations: si ves: Wave p	cs: Temperature, ic mple harmonic mor propagation, interfe trical optics, optica	tion, dar erence, re	mped an	nd driven n, transn	n oscillation	ns, resonan	ice			
4			th practice-oriented	d exercis	ses, basi	ic physic	es practical	course – I	Part 2 (3			
-			nents:									
5	Formal:	No		Participation requirements:								
5			JIIC									
5	Content:	M	ontents of the modu odules: 95 Physics 1	ıle Phys	ics 1 (1	195)						
6	Forms of	M 11 assessment:	ontents of the modu odules: 95 Physics 1	•		,						
	Forms of Written Prerequis	M 11 assessment: examination tite for the av	ontents of the modu odules:	inary ex	aminati	on						
6	Forms of Written Prerequis Module Applicati	assessment: examination site for the avexamination on of the mo	ontents of the modu odules: 95 Physics 1 n; each with prelim ward of credit points:	inary ex nary exa g study p	amination	on on nes)	ences B.En	g				
6	Forms of Written Prerequis Module Applicati Electric: Importan	assessment: examination interest for the avexamination on of the modal Engineering ce of the grades.	ontents of the modu odules: 95 Physics 1 n; each with prelim vard of credit points: n pass with prelimi dule (in the following	inary exanary exang study princering	amination	on on nes)	ences B.En	g				
6 7 8	Forms of Written Prerequis Module Applicate Electricate Important accordin	assessment: examination ite for the avexamination on of the mo al Engineeric ce of the grad g to BRPO coordinator:	ontents of the modu odules: 95 Physics 1 n; each with prelimi vard of credit points: n pass with prelimi dule (in the following ng B.Eng. and Eng de for the final grades	inary exanary exang study princering	amination	on on nes)	ences B.En	g				
6 7 8 9	Forms of Written Prerequis Module Applicati Electrica Importan accordir Module of Prof. Dr	assessment: examination ite for the avexamination on of the mo al Engineeri ce of the grad g to BRPO coordinator: . rer. nat. La formation:	ontents of the modu odules: 95 Physics 1 n; each with prelimi ward of credit points: n pass with prelimi dule (in the following ng B.Eng. and Eng	inary exanger inary exanger inactions in the control in the contro	amination amination of the composition of the compo	on nes) uter Scio	ences B.En	g				

a .		
(rei	rm	an

Pract	ical Projec	t / Internship							PRA	
Identi numb	fication er:	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duration	n:
1292		450 h	15	7th s	em.		each seme	ster	12 weel	ks
1	Course:		Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study	
	Lecture		60 students		0	SCH	0	h	450	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
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
2	Learning	outcomes/comp	etences:		ļ	1	+	1		
	in a pract and deve	ice-oriented n lop suitable se	ctivities and lear nanner. To this e olution strategies resentation and o	nd, studes. The m	ents sho nain air	ould wo n is to c	rk independ	ently on e	ngineering	projects
3	Contents:									
	include a activity r	n engineering eport and the	m the field of act g task. At the en students a final onal advising fro	d of the report.	work During	term, th	e supervisi ctical phase	ng compa	ny is to pr	epare an
4	Forms of t									
			g with exercises	as accor	mpanyi	ng guid	ance			
5		on requirement								
	Formal:	None								
	Content:	None	,							
6	Term par	assessment:								
7			l of credit points:							
,	_	examination p								
8			e (in the following	study pr	ogramn	nes)				
O			B.Eng, Engineer				s B Eng M	echanical	Engineerir	าด
			B.Sc., Renewable							
9	Importance	e of the grade f	for the final grade:							
		g to BRPO	5.							
10		oordinator:								
		-Ing. Anton K	lar							
11	Other info									
			unced at the beg	inning o	of the co	ourse.				
12	Language									
	German									

Proj	ect								PR	
Iden	tification ber:	Workload:	Credits:	Study	semes	ter:	Frequency	y of the	Duratio	on:
121	7	150 h	5	5 6th sem.			Annual (Summer)		1 semester	
1	Course:	ı	Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study	
	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 of	or seminar	15 students		2	SCH	30	h	120	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
2	Learning	outcomes/com	petences:		•	·	Ť	·		·
		planning								
		to work in a								
		unication ski	lls							
	- Motiva	ition								
3	Contents:									
		managemen	t							
		unication								
		edge manage	ment							
	- Engine	ering work								
4	Forms of									
4		-	work in small gr	ouns of	ona to	two stud	lonts			
5		on requiremen		oups of	one to	two stuc	icitis			
J	Formal:	Non								
	Content:	Non								
6		assessment:	-							
-		tion exam								
7	Prerequisi	te for the awar	d of credit points:							
	_	examination p	_							
8			le (in the following	g study pr	ogramr	nes)				
		l Engineering								
9	_	_	for the final grade:							
		g to BRPO								
10		oordinator:								
		-Ing. Rüdiger	Schultheis							
11	Other info									
			ounced at the beg	ginning o	f the c	ourse.				
12	Language									
	German									

	puter Arcl	nitectures							RA	
dent	ification er:	Workload	: Credits:	Study	y semes	ter:	Frequenc	y of the	Duratio	on:
1231		150 h	5	5th s	sem.		Annual (Winter)		1 seme	ester
l	Course:		Planned group	sizes	Scope		Actual contact time / classroom teaching		e Self-stud	ly
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
		or seminar	15 students		1	SCH	15	h	22.5	h
Practical or										
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
	Learning	outcomes/co	ompetences:		+		1			
	• '	The studen	ts know how mode	rn comp	uter ha	rdware w	orks, esp	ecially mid	croprocess	ors.
	•]	Based on tl	ne concept of a Vor	n Neuma	nn con	puter, st	udents ev	aluate and	analyse va	arious
	1	basic archi	tecture concepts.						-	
	• '	The studen	ts explain how Von	Neuma	nn com	puters ca	an be prog	grammed a	at the mach	ine lev
	• '	They conve	ert number represer	ntations b	oetweei	any pos	sition syst	ems.		
		•	in the representatio						different b	inary
		encodings.	•				. 1			•
	• '	They know	memory hierarchie	es and bu	ıs syste	ems and a	dvanced	architectu	re concepts	S.
		•	in the computer arc		•				-	
			al computer archite		_			•		
			They develop smal		•			_	_	
		(e.g. using	CUDA C).				_			
	Contents:									
			overview of comput	ter archi	tectures	3				
	•	Historical o	overview of computann architecture	ter archi	tectures	3				
	•	Historical o Von Neum	ann architecture							
	•	Historical o Von Neum Design of o	ann architecture ligital computers ar	nd their o	compor	nents	level (esi	pecially in	the proces	sing of
	•	Historical of Von Neum Design of of Basic funct	ann architecture ligital computers ar ioning of processor	nd their o	compor	nents	level (esp	pecially in	the proces	sing of
	•	Historical of Von Neum Design of of Basic functing the machine in	ann architecture ligital computers ar ioning of processor structions)	nd their o	compor register	ents transfer	•	•	the proces	sing of
	•	Historical of Von Neum Design of of Basic functions in Computer a	ann architecture digital computers are ioning of processor structions) arithmetic (ALUs, I	nd their o	compor register	ents transfer	•	•	the proces	sing of
	•	Historical of Von Neum Design of of Basic functimachine in Computer a	ann architecture digital computers ar tioning of processor structions) arithmetic (ALUs, I erarchy (cache)	nd their o	compor register	ents transfer	•	•	the proces	sing of
	•	Historical of Von Neum Design of of Basic functimachine in Computer a Memory hi	ann architecture digital computers ar dioning of processor structions) arithmetic (ALUs, I erarchy (cache)	nd their of the state of the st	compor register oding or	nents transfer f number	s and cha	racters)	the proces	sing of
	•	Historical of Von Neum Design of of Basic function and the Computer of Memory his Bus system Advanced of Neuron and the State of	ann architecture digital computers ar tioning of processor structions) arithmetic (ALUs, I erarchy (cache) as architecture concep	nd their of the state of the st	comporegister	nents transfer number nt-of-orde	s and cha	racters)	the proces	sing of
	•	Historical of Von Neum Design of of Basic funct machine in Computer a Memory hi Bus system Advanced a Computer a	ann architecture digital computers ar tioning of processor structions) arithmetic (ALUs, I erarchy (cache) as architecture concep architecture of grap	nd their of the state of the st	comporegister	nents transfer number nt-of-orde	s and cha	racters)	the proces	sing of
		Historical of Von Neum Design of OB Basic funct machine in Computer a Memory hi Bus system Advanced a Computer a Programmi	ann architecture digital computers ar dioning of processor structions) arithmetic (ALUs, I erarchy (cache) as architecture concep architecture of grap ng in IA32 assemb	nd their of rs at the FPUs, co ets (pipel hics prod	compore register of ding of the component of the componen	ents transfer f number nt-of-orde	s and cha	racters)	the proces	sing of
		Historical of Von Neum Design of of Basic function and the Basic function and the Bus system Advanced of Computer and Programmi Programmi	ann architecture digital computers ar tioning of processor structions) arithmetic (ALUs, I erarchy (cache) as architecture concep architecture of grap	nd their of rs at the FPUs, co ets (pipel hics prod	compore register of ding of the component of the componen	ents transfer f number nt-of-orde	s and cha	racters)	the proces	sing of
	Forms of	Historical of Von Neum Design of of Basic function and the Basic function and the Bus system Advanced of Computer of Programmi teaching:	ann architecture digital computers ar tioning of processor structions) arithmetic (ALUs, I erarchy (cache) as architecture concep architecture of grap ng in IA32 assemb ng of graphics proc	rs at the FPUs, conts (pipel hics products (cessors (cess	comporegister ding of the component of t	nents transfer f number nt-of-orde	s and cha	on, etc.)		
	Forms of Lecture,	Historical of Von Neum Design of of Basic funct machine in Computer a Memory hi Bus system Advanced a Computer a Programmi Programmi teaching:	ann architecture digital computers ar tioning of processor structions) arithmetic (ALUs, I erarchy (cache) as architecture concep architecture of grap ng in IA32 assemb ng of graphics proc tyle teaching (exe	FPUs, conts (pipel thics products cessors (cessors in the cessors in the cessor in	comporregister ding or ines, or cessors e.g. via	nents transfer f number ut-of-orde	s and charer execution	on, etc.)		
	Forms of Lecture,	Historical of Von Neum Design of of Basic funct machine in Computer a Memory hi Bus system Advanced a Computer a Programmi Programmi teaching:	ann architecture digital computers ar tioning of processor structions) arithmetic (ALUs, I erarchy (cache) as architecture concep architecture of grap ng in IA32 assemb ng of graphics proc	FPUs, conts (pipel thics products cessors (cessors in the cessors in the cessor in	comporregister ding or ines, or cessors e.g. via	nents transfer f number ut-of-orde	s and charer execution	on, etc.)		
	Forms of Lecture, assemble	Historical of Von Neum Design of of Basic funct machine in Computer a Memory hi Bus system Advanced a Computer a Programmi Programmi teaching:	ann architecture digital computers ar cioning of processor structions) arithmetic (ALUs, I erarchy (cache) as architecture concep architecture of grap ng in IA32 assemb ng of graphics proc tyle teaching (exe I tasks for programs	FPUs, conts (pipel thics products cessors (cessors in the cessors in the cessor in	comporregister ding or ines, or cessors e.g. via	nents transfer f number ut-of-orde	s and charer execution	on, etc.)		

Basic computer science and programming skills

Content:

	Basic knowledge of digital technology
	Modules:
	1045 Digital Electronics II;
	1070 Digital Electronics I;
	1105 Computer Science 1
6	Forms of assessment:
	Written 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)
	Electrical Engineering B.Eng, Engineering Computer Sciences B.Eng and Mechatronics B.Sc.
9	Importance of the grade for the final grade:
	according to BRPO
10	Module coordinator:
	Prof. DrIng. Wolfram Schenck
11	Other information:
	Literature will be announced at the beginning of the course.
12	Language:
	German

Aut	omatic Cor	ntrol Engineer	ring						RT			
	ntification nber:	Workload:	Credits:	Stuc	ly semes	ter:	Frequenc offer	ey of the	Duratio	on:		
123	5	150 h	5	4th	sem.		Annual (Summer)		1 sem	ester		
1	Course:	'	Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study			
	Lecture		60 students		2	SCH	30	h	45	h		
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h		
	Exercise		20 students		0	SCH	0	h	0	h		
	Practical	or seminar	15 students		1	1 SCH	15	h	22.5	h		
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h		
2	Learning	outcomes/com	petences:		!	-1	-		<u>I</u>	•		
3	Contents - Bas - Des don - Pro	hods basic features ic concepts of scription and anain perties of sing	gle-loop control less of digital regulars f automatic control less of linear, gle-loop control less of linear,	ol engin	neering nvariant	systems	in the tin	ne domain a	nd freque	ency		
	met	 Design of single-loop control loops by means of root locus curve and frequency response methods Basic features of digital regulations 										
4		teaching:	<i>5</i> - <i>G</i>									
			anying seminar ex	xercises	and pra	acticals						
5		tion requiremen										
	Formal:	Non	ie									
	Content:		dules Mathematic ineering 1 (1071									
6		assessment:				_						
			each with prelim	inary e	xaminat	ion						
7	Prerequis	ite for the awa	rd of credit points: pass with prelimi									
8	Applicati	on of the modu	tle (in the following B.Eng. and Ren	g study p	rogramı	nes)						
9			for the final grade:		Life	o D.Elig	·•					
-	_	g to BRPO	6									
10	Module o	coordinator:	aidama									
11		Ing. Dirk Wormation:	eidemann									
11		ormanon: re will be ann	ounced at the bea	vinning	of the c	Ollrea						
			ounced at the beg	5111111115	or the c	ourse.						
12	Language German	e:	ounced at the beg	Simmig	or the c	ourse.						

	ootics								ROB	
Iden num	tification	Workload:	Credits:	Stud	y semest	er:	Frequency offer	of the	Duratio	on:
124		150 h	5	5th s	sem.		Annual (Winter)		1 seme	ester
1	Course:		Planned group s	Planned group sizes		e	Actual contact time / classroom teaching		Self-study	
	Lecture		60 students				30	h	45	h
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h
	Evereise		20 students		0	SCH	0	h	0	h
	Exercise Practical or seminar		15 students	1	SCH	15	h	22.5	h	
	Tractical	or seminar	13 students		1	SCII	13	11	22.3	"
	Superviso	ed self-study	60 students		0	SCH	0	h	0	h
3	Contents	_	in robotics and re							
	- Manip - Robot - Forwa - Mobil - Senso - Artific - Behav	kinematics (in and inverse robots rs for mobile	robots ce and robotics	ıl founda	ations)					
	Forms of	teaching:								
4			1 . 1							
			ed teaching with e	exercise	s, practi	cal cour	rse			
5		tion requiremer	nts:	exercise	s, practi	cal cou	rse			
	Formal: Content:	tion requirement Non	nts:					Mechanics,	Electrica	al
	Formal: Content:	tion requirement Non Mati Eng	nts: e	, Compı	ıter Scie			Mechanics,	Electrica	al
	Formal: Content: Forms of	Non Mat Eng assessment:	e hematics 1 and 2, ineering 1 and 2,	, Compt Physics	ıter Scie	ence, En	gineering l			
5	Formal: Content: Forms of Written	Non Mat Eng assessment: examination,	nts: e hematics 1 and 2,	, Compt Physics	ıter Scie	ence, En	gineering l			
5	Formal: Content: Forms of Written Prerequise	non requirement Non Mat Eng assessment: examination, site for the awar	hematics 1 and 2, combination example.	, Compu Physics mination	n, perfo	ence, En	gineering l			
5	Formal: Content: Forms of Written Prerequis Module	Non Mat Eng assessment: examination, site for the awar examination	hematics 1 and 2, ineering 1 and 2, combination example of credit points:	, Compu Physics mination	n, perfo	ence, En	gineering l			
5 6 7	Formal: Content: Forms of Written Prerequis Module Applicati Apparat	non requirement Non Mat Eng assessment: examination, site for the awar examination of the modulive Biotechnological Non Recognition of the modulive Biotechnological Non Recognition of the modulive Biotechnological Non Recognition (Non Recogniti	hematics 1 and 2, ineering 1 and 2, combination example of credit points: pass and course a de (in the following blogy B.Sc., Elect	, Compu Physics mination assessment g study p	n, perfo	rmance nes) ng B.En	gineering lexamination	on or oral exercing Comp	xaminatio	on
5 6 7 8	Formal: Content: Forms of Written Prerequis Module Applicati Apparat B.Eng.,	material in the module in the	hematics 1 and 2, ineering 1 and 2, combination example of credit points: pass and course a le (in the following B.Sc., Elect B.Sc. and Indust	, Compu Physics mination assessme g study p crical En	n, perfo	rmance nes) ng B.En	gineering lexamination	on or oral exercing Comp	xaminatio	on
5 6 7	Formal: Content: Forms of Written Prerequis Module Applicati Apparat B.Eng., Importan	tion requirement Non Matter Engrassessment: examination, site for the awar examination on of the modulive Biotechnot Mechatronics ce of the grade	hematics 1 and 2, ineering 1 and 2, combination example of credit points: pass and course a de (in the following blogy B.Sc., Elect	, Compu Physics mination assessme g study p crical En	n, perfo	rmance nes) ng B.En	gineering lexamination	on or oral exercing Comp	xaminatio	on
5 6 7 8	Formal: Content: Forms of Written Prerequis Module Applicati Apparat B.Eng., Importan accordin	material in the module in the	hematics 1 and 2, ineering 1 and 2, combination example of credit points: pass and course a le (in the following B.Sc., Elect B.Sc. and Indust	, Compu Physics mination assessme g study p crical En	n, perfo	rmance nes) ng B.En	gineering lexamination	on or oral exercing Comp	xaminatio	on
5 6 7 8	Formal: Content: Forms of Written Prerequis Module Applicati Apparat B.Eng., Importan accordir Module of	material in the second of the moduli in the second of the grade of the	hematics 1 and 2, ineering 1 and 2, combination example of credit points: pass and course a alle (in the following allogy B.Sc., Elect B.Sc. and Indust for the final grade:	, Compu Physics mination assessme g study p crical En	n, perfo	rmance nes) ng B.En	gineering lexamination	on or oral exercing Comp	xaminatio	on
6 7 8 8	Formal: Content: Forms of Written Prerequis Module Applicati Apparat B.Eng., Importan accordir Module of Prof. Dr	tion requirement Non Mat Eng assessment: examination, site for the awar examination of the modulive Biotechnot Mechatronics are of the grade ag to BRPO coordinator: rer. nat. Mar formation:	hematics 1 and 2, ineering 1 and 2, combination example of credit points: pass and course a alle (in the following allogy B.Sc., Elect B.Sc. and Indust for the final grade:	, Compu Physics mination assessme g study p crical Engerial Engerial	nter Scient, performant performant performant performant periodic	ence, Enrmance mes) ng B.En g and M	examination g., Enginee	on or oral exercing Comp	xaminatio	on

12	Language:	Ī
	German	

Sens	ors								SEN			
Ident	ification er:	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duratio	on:		
1242		150 h	5	4th seme	or ester	6th	Annual (Summer))	1 seme	ester		
1	Course:	1	Planned group s	sizes	Scope	2)	Actual co / classroo teaching	ontact time om	Self-study			
	Lecture		60 students		2	SCH	30	h	45	h		
	Tuition in	n seminars	30 students			SCH	15	h	22.5	h		
	Exercise		20 students		0	SCH	0	h	0	h		
		or seminar	15 students		1	SCH	15	h	22.5	h		
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h		
3	amplifyi tasks and	ng the sensor d design a mea tts of their wo	of action. They k output. The stude suring circuit. Th	ents can	select a	suitable	e sensor for	the most co	ommon m	easuring		
	AD coMeasuInductTempo	aring amplifie onverter types aring bridges tive, capacitive erature measu al sensors	e and resistive se	ensors								
4		teaching:										
				boratory	oratory exercises							
5	Participat Formal:	1068										
	Content:		ules: Electrical Engir	neering 2	2							
6		assessment: examination;	each with prelim	inary ex	aminati	on						
7	Prerequis	ite for the awar	d of credit points:	·								
8	Applicati	on of the modu	le (in the following B.Eng. and Eng	g study pi	rogramm	nes)	ences R En	σ				
9	Importan	ce of the grade	for the final grade:		, comp	att 1901	checs D.Ell	5				
10	Module c	g to BRPO coordinator: Ing. Thomas	Westerwalbeslo	h								
11	Other info	ormation:	ounced at the beg		of the co	ourse.						
12	Language	e:										

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(larmon
German

Sign	nals and Sy	stems							SigSys	S	
Iden num	tification ber	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duratio	on:	
112		150 h	5	4th seme	or ster	6th	Annual (Summer)		1 seme	1 semester	
1	Course:		Planned group s	Planned group sizes		e	Actual contact time / classroom teaching		Self-study		
	Lecture		60 students		2 SCH		30 h		45	h	
	Tuition in seminars		30 students		1	SCH	15	h	22.5	h	
	Exercise		20 students		0	SCH	0	h	0	h	
		or seminar	15 students		1	SCH	15	h	22.5	h	
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h	
	- reco	ropriate transfo ognise linear and culate and eval	nt signal represt ormations and ap nd non-linear timu uate the transition d digital modula	oply then ne-varyir on from a	n, ng syste nalogu	ems and te to dig	explain th	eir essentia ,	l properti	ies,	
3	Contents:										
3	- Con La I - Disc tran - Fun - Line - The - Met	el calculation, atinuous-time select transform crete-time signsform) damentals of sear time invariear and non-line sampling the chods of analogeness.	pectral analysis ant systems hear distortions	functio	nal tr	ansform					
4	- Lev - Con La I - Disc tran - Fun - Line - Line - The - Met - Thro Forms of Lecture,	el calculation, atinuous-time se Place transform crete-time signsform) damentals of sear time invariear and non-lires sampling the chods of analogue laboratory presentations: teaching: seminar-based	n), nals and their pectral analysis ant systems hear distortions brem gue and digital m bracticals in smal	functio nodulatio ll groups	on proc	ansform	ations (z-				
	- Lev - Con La I - Disc tran - Fun - Line - Line - The - Met - Thro Forms of Lecture,	el calculation, atinuous-time se Place transform crete-time sig sform) damentals of sear time invari ear and non-lir sampling theo hods of analog ee laboratory pe teaching: seminar-based ion requirement	n), nals and their pectral analysis ant systems hear distortions orem gue and digital m oracticals in small	function fun	on proc	esses in smal	ations (z-	transform,	discrete	Fourie	
1	- Lev - Con La I - Disc tran - Fun - Line - Line - The - Met - Thro Forms of Lecture, Participat Formal: Content:	el calculation, atinuous-time se Place transform crete-time signsform) damentals of sear time invaries and non-lir sampling the chods of analoge laboratory per teaching: Seminar-based ion requirement None Math assessment:	n), nals and their pectral analysis ant systems hear distortions orem gue and digital moracticals in small	function fun	on procesticals	esses in smal Electric	l groups.	ring 1 (107	discrete	Fouri	
i 5	- Lev - Con La I - Disc tran - Fun - Line - Line - The - Met - Thro Forms of Lecture, Participat Formal: Content:	el calculation, atinuous-time se Place transform crete-time signsform) damentals of sear time invariear and non-lir sampling the chods of analogue laboratory per teaching: seminar-based ion requirement None Math assessment: or oral examinite for the award	n), nals and their pectral analysis ant systems hear distortions brem gue and digital m bracticals in small distances: ematics 1 (1146) ation; in each call of credit points:	function function function and along practices at the property of the function of the function of the function	on processive acticals	esses in smal Electric nary exa	l groups.	ring 1 (107	discrete	Fouri	
1	- Lev - Con La I - Disc tran - Fun - Line - Line - The - Met - Thro Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequis Module	el calculation, atinuous-time service transform crete-time significant significant significant significant sampling the chods of analogue laboratory proceed teaching: Seminar-based	n), nals and their pectral analysis ant systems hear distortions brem gue and digital m bracticals in small distances: ematics 1 (1146) ation; in each ca	function fun	on processive series of the se	esses in smal Electric nary exa	l groups.	ring 1 (107	discrete	Fouri	
1	- Lev - Con La I - Disc tran - Fun - Line - Line - The - Met - Thro Forms of Lecture, Participat Formal: Content: Forms of Written Prerequis Module Applicati Electrica	el calculation, atinuous-time se Place transform crete-time signsform) damentals of sear time invaries and non-lir sampling the chods of analoge laboratory per teaching: seminar-basedion requirement None Math assessment: or oral examinite for the award examination per confidence in modulal Engineering	nals and their pectral analysis ant systems hear distortions orem gue and digital moracticals in small teaching, laboratics: ematics 1 (1146) ation; in each call of credit points: ass with preliminals and their contents are their call of credit points:	function fun	on processive acticals or prelimination or processive mination of the present of	esses in smal Electric nary exa	l groups. al Enginee	ring 1 (107	discrete	Fouri	

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

Simu	ılation Tec	chnology								SIM	
	Identification Workload:			Credits:	Study	Study semester:			of the	Duration:	
1244	1244 150 h			5	5th se	em.		Annual (Winter)		1 semes	ter
1	Course:		Pla	anned group siz	es	Scope	;	Actual co / classroo teaching	ontact time om	Self-study	,
	Lecture		60 students			2	SCH	30	h	45	h
	Tuition in	n seminars 30		30 students		1	SCH	15	h	22.5	h
	Exercise		20	students		0	SCH	0	h	0	h
	Practical	or seminar	15	students		1	SCH	15	h	22.5	h
	Supervise	ed self-study	60	students		0	SCH	0	h	0	h

2 Learning outcomes/competences:

Students:

- have an overview of the different approaches to model-based development.
- create physical and electrical models and implement them in graphical form (as a block diagram, for example) in a simulation environment (such as MATLAB/Simulink).
- derive simulation parameters from the models and configure the simulation software accordingly.
- simulate physical and electrical models on a computer and evaluate the simulation results.
- compare simulated time curves of a model with the measured signals of a real system and assess the model quality and simulation accuracy.
- can discretise continuous-time models and implement them on an embedded system in the form of difference equations (z-superposition functions).
- understand the essential principles of one-step procedures and evaluate the different procedures in terms of efficiency, stability and accuracy.
- outline and explain one-step procedures (e.g. in the direction field).

3 Contents:

- Introduction to simulation technology.
- Model-based development (software-in-the-loop, model-in-the-loop, hardware-in-the-loop and rapid control prototyping).
- Methods of modelling (types of models, physical modelling and representation in the form of block diagrams).
- Modelling of mechanical systems and electrical circuits.
- Extended state form and introduction of the descriptor form.
- Structural singularities and algebraic loops.
- Introduction in the sampling systems (difference equations and z- transformation)
- One-step procedures (Euler procedure, Heun procedure, family of Runge-Kutta procedures).
- Stability and accuracy of one-step procedures.
- Simulation practical course

4 Forms of teaching:

Lecture, seminar-based teaching with exercises, practical course

5	Participation requ	irements:						
	Formal:	None						
	Content:	Modules:						
		1233 Automatic Control Engineering						
6	· ·							
	Written or oral e	examination; in each case with preliminary examination performance						
7	Prerequisite for th	e award of credit points:						
		ation pass with preliminary examination						
8		module (in the following study programmes)						
		eering B.Eng, Engineering Computer Sciences B.Eng and Mechatronics B.Sc.						
9	_	grade for the final grade:						
	according to BR	PO						
10	Module coordinat	or:						
	Prof. DrIng. M							
11	Other information	:						
	Literature will b	e announced at the beginning of the course.						
12	Language:							
	German							

Stud	lent Resear	ch Project							STA	
Iden num	tification ber:	Workload:	Credits:	Study	semes	er:	Frequency offer	of the	Duratio	on:
125	4	150 h	5 5th		sem.		Annual (Winter)		1 semester	
1	Course:		Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study	
	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	120	h
		d self-study	60 students		0	SCH	0	h	0	h
2	- Projec - Ability	outcomes/comp t planning to work in a nunication skil	team							
3	Contents:									
	- Comm	t managemen nunication ledge manage eering work tation								
4	Forms of	teaching:								
	Homewo	ork or project	work in small gr	oups of o	one to	wo stud	ents			
5	Participat	ion requiremen	ts:							
	Formal:	Non	-							
	Content:	Non	e							
6		assessment:								
7	Prerequisi	ite for the awar	d of credit points:							
8	Application		le (in the following	g study pr	ogramr	nes)				
9	Importance	-	B.Eng. for the final grade:	:						
10		g to BRPO oordinator:								
10		oordinator: -Ing. Rüdigei	Schultheis							
11	Other info		Schulmers							
			ounced at the beg	ginning o	of the c	ourse.				
12	Language	:								
	German									

	ectics of Te	echnology							EDU/	TD
Iden num	rification per:	Workload:	Credits:	Study	semes	ter:	Frequency of the offer		Duration:	
1312		150 h	5	6th s	em.		Annual (Summer)		1 semester	
1	Course:		Planned group s	Planned group sizes		pe	Actual contact time / classroom teaching		Self-study	
	Lecture		60 students		0	SCH	0	h	0	h
	Tuition in	n seminars	30 students		4	SCH	60	h	90	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		0	SCH	0	h	0	h
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h
2	Learning	outcomes/con	mpetences:			1				
	- plan - syst and - inco	n, prepare, in tematise the target group orporate the o the didaction	special scientific to concept,	uate less a specifi	ons, c to tea	aching, s	elect and	use them ac		
3	- stru - sele Contents - Edu - Did elec - The	ect suitable for extractional objectrical engine extrical engine extrical engine extractions, model ving strategies	t and subsequently t content in a learn orms of examination ectives and standardles of the vocation eering occupations ls, methods and mees in activity-orientication, presentation	rds, framal fields) cdia (e.g.	nework of stud	ted mann the select c curricul dy (e.g. le	a and trainearning ficaching and	ning plans, į	guideline in mecha	es, anical and
3	- stru - sele Contents - Edu - Did elec - The solv - Use	cture subject suitable for the suitable	ectives and standar oles of the vocation eering occupations ls, methods and me	rds, framal fields) cdia (e.g.	nework of stud	ted mann the select c curricul dy (e.g. le	a and trainearning ficaching and	ning plans, į	guideline in mecha	es, anical and
	- stru - sele Contents - Edu - Did elec - The solv - Use Forms of Tuition : Participal	ect suitable for extractional objectical engine errical engine errical strategies of communications and communications are consistent of the error o	ectives and standar oles of the vocation eering occupations ls, methods and me es in activity-orient dication, presentation	rds, framal fields) cdia (e.g.	nework of stud	ted mann the select c curricul dy (e.g. le	a and trainearning ficaching and	ning plans, į	guideline in mecha	es, anical and
4	- stru - sele Contents - Edu - Did elec - The solv - Use Forms of Tuition Participal Formal: Content:	cet suitable for sect suitable for sect suitable for sect suitable for sectional objection of section requirements of section of sec	ectives and standar oles of the vocation eering occupations ls, methods and me es in activity-orient dication, presentation	rds, framal fields) cdia (e.g.	nework of stud	ted mann the select c curricul dy (e.g. le	a and trainearning ficaching and	ning plans, į	guideline in mecha	es, anical and
4 5	- stru - selection - selection - Did election - The solv - Use - Truition - Participal - Forms of Tuition - Perform - Perform - Prerequise	cture subject set suitable for the suita	ectives and standar oles of the vocation eering occupations ls, methods and me es in activity-orien cication, presentation	rds, framal fields) cdia (e.g.	nework of stud	ted mann the select c curricul dy (e.g. le	a and trainearning ficaching and	ning plans, į	guideline in mecha	es, anical and
4 5 6	- stru - sele Contents - Edu - Did elec - The solv - Use Forms of Tuition : Formal: Content: Forms of Perform Prerequis Module Applicati	cture subject set suitable for the aw examination of the modern of the m	ectives and standard of the vocation of examination of examination of examination of ectives and standard of the vocation of eering occupations and the ering occupations are in activity-orient dication, presentation of credit points: and of credit points:	rds, framal fields can and leading teach and leading and leading growth and leading growth and leading growth and leading and leading growth and leading and leading growth growth and leading growth growt	nework of studenting)	ted mann the select c curricul dy (e.g. l- ing of tea g techniq	a and trainearning ficaching and	ning plans, į	guideline in mecha	es, anical an
4 5 6	- stru - sele Contents - Edu - Did elec - The solv - Use Forms of Tuition Participal Formal: Content: Forms of Perform Prerequis Module Applicati Electrica Importan	cet suitable for set set suitable for se	ectives and standard of credit points: ard of credit points: a pass	rds, framal fields) edia (e.g. ted teach on and le	nework of studenting)	ted mann the select c curricul dy (e.g. l- ing of tea g techniq	a and trainearning ficaching and	ning plans, į	guideline in mecha	es, anical and
4 5 6 7 8 9	- stru - sele Contents - Edu - Did elec - The solv - Use Forms of Tuition Participal Formal: Content: Forms of Perform Prerequis Module Applicati Electrica Importan accordin	cet suitable for sect suitable for sect suitable for sect suitable for sect suitable for sectional object section engine sections, model wing strategies of communation requirements ance test site for the away examination of the model Engineering of the grading to BRPO	ectives and standard of the vocation design occupations and metering occupations and metering occupations and metering occupations are in activity-orientation, presentation of credit points: and of credit points: and pass dule (in the following on B.Eng. and Medical comments)	rds, framal fields) edia (e.g. ted teach on and le	nework of studenting)	ted mann the select c curricul dy (e.g. l- ing of tea g techniq	a and trainearning ficaching and	ning plans, į	guideline in mecha	es, anical an
4 5 7 8	- stru - sele Contents - Edu - Did elec - The solv - Use Forms of Tuition Participar Formal: Content: Forms of Perform Prerequis Module Applicati Electrica Importan accordir Module of Prof. Dr	cet suitable for the suitable for the award examination on of the model to the gradient of the	ectives and standard of the vocation design occupations and metering occupations and metering occupations and metering occupations are in activity-orientation, presentation of credit points: and of credit points: and pass dule (in the following on B.Eng. and Medical comments)	rds, framal fields) edia (e.g. ted teach on and le	nework of studenting)	ted mann the select c curricul dy (e.g. l- ing of tea g techniq	a and trainearning ficaching and	ning plans, į	guideline in mecha	es, anical an

12 Language:
German

	nnical Engl	ish 1							FSE1	
Ident	tification	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duration	ı:
1085		150 h	5 1st seme		or ster	3rd	Annual (Winter)		1 semester	
1	Course:		Planned group s	Planned group sizes		e	Actual contact time / classroom teaching		Self-study	
	Lecture				0	SCH	0	h	0	h
	Tuition in seminars		30 students		4	SCH	60	h	90	h
	Exercise				0	SCH	0	h	0	h
	Practical	or seminar			0	SCH	0	h	0	h
	Supervise	ed self-study	30 students		0	SCH	0	h	0	h
	- So pr - M an a - Pe	early and in decial competer resentations, to tethodological nalysis of technology way that is appersonal compe	and fluently in e- etail in English be- ence: They try- eamwork and pro- competence: The nical texts and for propriate for the etence: They are ucture authentic:	oth in spout and ject workey use the resolving target grable to	consoleration co	and wr olidate of d strateg xtual tas	iting. communica gies for cor ks. They ca	tive key tent acqui n present	skills in sition and technical i	English critical ssues in
3	Contents:							neet dead	.nes.	
3	- TI - TI di m tra - TI	he students can hey master the mensions and aterials; manu ansmission).	n describe releva ne core terminol d shapes; mathe facturing and aud interdisciplinary rams).	ogy of matical tomatior	eering the tec opera i; energ	disciplir chnical tions; fo gy and e	nes. topic (e.g. orces and lectricity; le	base unit mechanisi ogistics; da	s in engi ns; prope ata process	rties of sing and
3	- TI di m tra - TI di	he students cathey master they master themensions and aterials; manuansmission). They possess scussing diagram teaching:	ne core terminol d shapes; mathe facturing and aud interdisciplinary	ogy of matical tomation skills	eering the tec opera ; energ (email	disciplinchnical tions; for gy and eing; pr	nes. topic (e.g. orces and lectricity; le	base unit mechanisi ogistics; da	s in engi ns; prope ata process	orties of sing and
	- Ti di m tra - Ti di forms of Seminar-	he students cathey master they master themensions and aterials; manuansmission). They possess scussing diagram teaching:	ne core terminol d shapes; mathe facturing and aut interdisciplinary rams).	ogy of matical tomation skills	eering the tec opera ; energ (email	disciplinchnical tions; for gy and eing; pr	nes. topic (e.g. orces and lectricity; le	base unit mechanisi ogistics; da	s in engi ns; prope ata process	orties of sing and
	- Ti di m tra - Ti di forms of Seminar- Semester	he students can hey master the mensions and aterials; manu- ansmission). hey possess scussing diagnosess teaching:	ne core terminol of shapes; mathe offacturing and aud interdisciplinary rams). og, individual and gnment)	ogy of matical tomation skills	eering the tec opera ; energ (email	disciplinchnical tions; for gy and eing; pr	nes. topic (e.g. orces and lectricity; le	base unit mechanisi ogistics; da	s in engi ns; prope ata process	orties of sing and
4	- Ti di m tra - Ti di forms of Seminar- Semester	he students can hey master the mensions and aterials; manu- ansmission). hey possess scussing diagrateaching: teaching: -based teaching r project (Assi	ne core terminol d shapes; mathe facturing and aut interdisciplinary rams). ag, individual and gnment)	ogy of matical tomation skills	eering the tec opera ; energ (email	disciplinchnical tions; for gy and eing; pr	nes. topic (e.g. orces and lectricity; le	base unit mechanisi ogistics; da	s in engi ns; prope ata process	rties of sing and
4	- Ti di m tra - Ti di Forms of Seminar- Semester	he students can hey master the mensions and aterials; manual ansmission). They possess scussing diagrateaching: -based teaching reproject (Assistion requirement None Engl	ne core terminol d shapes; mathe ifacturing and aut interdisciplinary rams). g, individual and gnment) ts:	ogy of ematical tomation skills	eering the tec opera i; energ (email	disciplinchnical tions; for gy and eding; protection.	nes. topic (e.g. orces and lectricity; le oject work	base unit mechanisi ogistics; da	s in engines; prope ata process ation tech	orties of sing and
4	- TI di m tra - TI di forms of Seminar- Semester Participat Formal: Content:	he students can hey master the mensions and aterials; manual ansmission). They possess scussing diagrateaching: -based teaching reproject (Assistion requirement None Engl	ne core terminol d shapes; mathe facturing and aut interdisciplinary rams). g, individual and gnment) ts:	ogy of ematical tomation skills	eering the tec opera i; energ (email	disciplinchnical tions; for gy and eding; protection.	nes. topic (e.g. orces and lectricity; le oject work	base unit mechanisi ogistics; da	s in engines; prope ata process ation tech	rties of sing and
4	- Ti di m tra - Ti di forms of Seminar- Semester Participat Formal: Content:	he students can hey master the mensions and aterials; manual ansmission). They possess scussing diagrateaching: -based teaching reproject (Assistant ion requirement None Engly Frame in the student in	ne core terminol of shapes; mathe offacturing and aud interdisciplinary rams). ag, individual and gnment) ts: c ish language com nework for Language	ogy of ematical tomation skills	eering the tec opera i; energ (email	disciplinchnical tions; for gy and eding; protection.	nes. topic (e.g. orces and lectricity; le oject work	base unit mechanisi ogistics; da	s in engines; prope ata process ation tech	rties o

	70% attendance and active participation; passed semester project and written exam
8	Application of the module (in the following study programmes)
	Electrical Engineering B.Eng, Engineering Computer Sciences B.Eng and Renewable Energies B.Eng.
9	Importance of the grade for the final grade:
	according to BRPO
10	Module coordinator:
	OStR Cornelia Biegler-König
11	Other information:
	Literature will be announced at the beginning of the course. Textbook, additional
	materials, intranet self-study courses
12	Language:
	English

	nnical Engl	lish 2							FSE2	
	tification Workload:		Credits:	Study	semes	er:	Frequency	of the	Duration	n:
1086		150 h	5	4th seme	or ster	6th	Annual (Summer)		1 semester	
1	Course:		Planned group s	Planned group sizes Scope 0 SCH		e	/	contact time m teaching	Self-study	
						SCH	0	h	0	l h
		n seminars	30 students		4	SCH	60	h	90	h
	Exercise				0	SCH	0	h	0	h
	Practical	or seminar			0	SCH	0	h	0	h
	Supervise	ed self-study	30 students		0	SCH	0	h	0	h
	es - M Th co - Pe	pecially in En ethodological ney present the ontexts and ma	nce: they develor glish-speaking be competence: Them shortly and coke a critical assectence: They show h sources.	usiness eney are a concisely, essment.	enviror able to both i	ments. skim te n speaki	chnical te	xts for esse writing. Th	ential inforces	rmation. sh wider
3		udents can act	ively participate					red case stu	dies (e.g.)	Industry
3	- St - Th 4.0 - Th	udents can act ney master the 0; automated s ney possess in conomic sector	ively participate core terminolog systems; discussi terdisciplinary s rs, manufacturin g; persuasion str	y for dea ng readi kills (e.g g proces	aling w ngs an g. proj	rith prob d trends) ect mana	lem-orien agement; l	ousiness pla	an and ma	ırketing;
	- St - Th 4.0 - Th ec ac	udents can act ney master the 0; automated s ney possess in conomic sector ademic writin	core terminolog systems; discussi iterdisciplinary s rs, manufacturin g; persuasion str	y for dea ing readi kills (e.g g proces ategies).	aling w ngs an g. proj ses; pi	rith prob d trends) ect mana tching a	lem-orien agement; l	ousiness pla	an and ma	ırketing;
4	- St - Th 4.0 - Th ecc ac	udents can act ney master the 0; automated s ney possess in conomic sector ademic writin	core terminolog systems; discussi iterdisciplinary s rs, manufacturin g; persuasion str	y for dea ing readi kills (e.g g proces ategies).	aling w ngs an g. proj ses; pi	rith prob d trends) ect mana tching a	lem-orien agement; l	ousiness pla	an and ma	ırketing;
4	- St - Th 4.0 - Th ec ac	udents can act ney master the 0; automated siney possess in conomic sector ademic writing teaching:	core terminolog systems; discussi iterdisciplinary s rs, manufacturin g; persuasion str g, individual and gnment)	y for dea ing readi kills (e.g g proces ategies).	aling w ngs an g. proj ses; pi	rith prob d trends) ect mana tching a	lem-orien agement; l	ousiness pla	an and ma	ırketing;
	- St - Th 4.0 - Th ec ac	udents can act ney master the 0; automated so ney possess in conomic sector ademic writing teaching: -based teaching project (Assignion requiremental Mod	core terminolog systems; discussi sterdisciplinary s rs, manufacturin g; persuasion str g, individual and gnment) ts: ules:	y for dea ing readi kills (e.g g proces ategies).	aling w ngs an g. proj ses; pi	rith prob d trends) ect mana tching a	lem-orien agement; l	ousiness pla	an and ma	ırketing;
4	- St - Th 4.0 - Th ec ac Forms of Seminar- Seminar	udents can act ney master the 0; automated siney possess in conomic sector ademic writing teaching: -based teaching project (Assignor requiremen Mod 1085	core terminolog systems; discussi systems; discussion str systems	y for dearing readickills (e.g processategies).	nling wings and g. projeses; pi	rith prob d trends) ect mana tching a	lem-orien o. agement; t technical	product; co	an and ma	ırketing;
4 5	- St - Th 4.0 - Th ec ac Forms of Seminar Seminar Participat Formal:	udents can act ney master the 0; automated siney possess in conomic sector ademic writing teaching: -based teaching project (Assignor requiremen Mod 1085	core terminolog systems; discussi systems; discussi sterdisciplinary s rs, manufacturin g; persuasion str g, individual and gnment) ts: ules: Technical Engli	y for dearing readickills (e.g processategies).	nling wings and g. projeses; pi	rith prob d trends) ect mana tching a	lem-orien o. agement; t technical	product; co	an and ma	rketing;
4	- St - Th 4.0 - Th ec ac Forms of Seminar Seminar Formal: Content:	teaching: -based teaching project (Assigner in Figure 2) -based teaching	core terminolog systems; discussi systems; discussi systems; discussi systems; discussi systems; discussi systems; discussi systems; discussion str systems sy	y for dearing readickills (e.g processategies).	nling wings and g. projeses; pi	rith prob d trends) ect mana tching a	lem-orien o. agement; t technical	product; co	an and ma	ırketing;
4 5	- St - Th 4.0 - Th ec ac Forms of Seminar- Seminar Formal: Content: Forms of Combinar Prerequis	udents can act ney master the 0; automated so ney possess in conomic sector ademic writing teaching: -based teaching project (Assignor requirement Mod 1085 Engl Fram assessment: ation examinatite for the award in the format of the first project (Assignor requirement) assessment:	core terminolog systems; discussi systems; discussi systems; discussi systems; discussi systems; discussi systems; discussi systems; discussion str systems sy	y for dea ing readi skills (e.g g proces ategies). d group v	work, e	tith probd trends) ect manatching a tching a tch	lem-orient). ngement; technical	product; co	an and ma	ırketing

8	Application of the module (in the following study programmes)
	Electrical Engineering B.Eng, Engineering Computer Sciences B.Eng. and Renewable Energies
	B.Eng.
9	Importance of the grade for the final grade:
	according to BRPO
10	Module coordinator:
	OStR Cornelia Biegler-König
11	Other information:
	Literature will be announced at the beginning of the course. Textbook, course
	supplementary materials, self-study courses
	Study programmes in Electrical Engineering, Engineering Computer Sciences, Renewable Energies:
	Elective subject
12	Language:
	English

	mal Use o	f Renewable I	Energies						TNE		
Ident	ification	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duration	n:	
1266		150 h	5	6th s	6th sem.			Annual (Summer)		1 semester	
1	Course:		Planned group sizes		Scop	e	Actual contact time / classroom teaching		Self-study		
	Lecture		60 students		2	SCH	30	h	45	h	
	Tuition in	n seminars	30 students		1	SCH	15	h	22.5	h	
	Exercise		20 students		0	SCH	0	h	0	h	
	Practical	or seminar	15 students		1	SCH	15	h	22.5	h	
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h	
3	thermal definition of the contents:	simulation mo	esponding system odels and can ana	llyse the							
	dom plar - Geo Practical heating	nestic hot water ats) othermal use. I drinking water	of renewable ener heating and bar Functioning of the experiments and rand swimming nance of a heat p	ckup heat pole simulate pools a	ating, s ump (g ions or	wimmin eotherm n the dir	g pool hea al heating a nensioning	ting, solar tand cooling of solar the	thermal po g) hermal sy	ower	
4	Forms of	teaching:									
		seminar, prac									
	Participat	ion requiremen	ts:								
	Participation requirements:										
5	Formal:										
			ules: 3 Physics 1; 2 Physics 2								
	Formal: Content: Forms of	1198 1202 assessment:	3 Physics 1; 2 Physics 2	go with	nralim	nary ove	amination -	nerformen o			
5	Forms of Written Prerequis	assessment: or oral examirite for the awar	Physics 1; Physics 2 nation; in each cad of credit points:	•	_	•	amination <u>I</u>	performanc	e		
6	Forms of Written Prerequis Module	assessment: or oral examinite for the awar examination p	Physics 1; Physics 2 nation; in each ca	nary exa	minatio	on	amination _I	performanc	e		
6	Forms of Written Prerequis Module Applicati Electrica	assessment: or oral examinite for the awar examination pon of the modu al Engineering	Physics 1; Physics 2 nation; in each ca d of credit points: cass with preliminate (in the following B.Eng. and Ren	nary exa g study pr ewable l	minatio	on nes)		performanc	e		
6	Formal: Content: Forms of Written Prerequis Module Applicati Electrica Important	assessment: or oral examinite for the awar examination pon of the modulal Engineering ce of the grade	Physics 1; Physics 2 nation; in each cad of credit points: pass with preliminate (in the following	nary exa g study pr ewable l	minatio	on nes)		oerformanc	e		
5 6 7	Formal: Content: Forms of Written Prerequis Module Applicati Electrica Importantaccordin Module of	assessment: or oral examinite for the awar examination pon of the modu al Engineering	Physics 1; Physics 2 nation; in each ca d of credit points: pass with preliminate (in the following B.Eng. and Ren for the final grade:	nary exa g study pr ewable l	minatio	on nes)		performanc	e		

Ī		Literature will be announced at the beginning of the course.
	12	Language:
		German

The	rmodynam	ics 1							TD1		
	tification	Workload:	Credits:	Study	semest	er:	Frequenc offer	y of the	Durati	on:	
num 126		150 h	5 2nd, sem.		4th or 6th		Annual (Summer)		1 semester		
1	Course:		Planned group si	Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study	
	Lecture		60 students		2	SCH	30	h	45	h	
	Tuition in	n seminars	30 students		2	SCH	30	h	45	h	
	Б		20 . 1 .		0	CCII	0	-		-	
	Exercise	or seminar	20 students 15 students		0	SCH	0	h h	0	h	
	Practical	or seminar	15 students		0	SCH	0	n	0	h	
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h	
2	Learning	outcomes/comp	etences:			ı		I			
3	Contents - Bas calc - 1st - Idea cha - 2nd - Circ and - Rea data	I situations. nicative compose a communicative acommunicative acommunication and beginners ic concepts so oric state varial law of thermose all gases: Therefore a calculations are acalculations are acalculations.	and confidently particles as system, each as simple reversible. Definitions of was of state in the teand tables	quilibriables wary / mation coing, entile component, pe	um, state ork and coving coving coof state ropy parative	ate varial heat losed sy of idea	an explain stions of a ables, cha estems, stall gases, sees of idegree of eff	nges, procentionary floor	mentative n nature.	ermal and ses y, simple	
		damentals of l	ieat transfer								
4	Forms of	teaching:	neat transfer								
	Forms of Lecture	teaching: and seminar									
4 5	Forms of Lecture	teaching:	ts:								
	Forms of Lecture Participa	teaching: and seminar tion requiremen	ts:								
	Forms of Lecture Participal Formal: Content:	teaching: and seminar tion requiremen None	ts:								
5	Forms of Lecture Participal Formal: Content: Forms of	teaching: and seminar tion requiremen None None assessment:	ts:	n							
5	Forms of Lecture Participal Formal: Content: Forms of Written	teaching: and seminar tion requiremen None None assessment: examination o	ts:	n							
5	Forms of Lecture Participal Formal: Content: Forms of Written Prerequis Module	teaching: and seminar tion requiremen None None assessment: examination o ite for the awar examination p	ts: e r oral examinatio d of credit points:								
5	Forms of Lecture Participal Formal: Content: Forms of Written Prerequis Module Applicati	teaching: and seminar tion requiremen None None assessment: examination of the module	ts: e r oral examinatio	study pr			g. and Rei	newable Er	nergies B.	Eng.	

	according to BRPO
10	Module coordinator:
	Prof. Dr. Peter Charles
11	Other information:
	Literature will be announced at the beginning of the course.
	Renewable Energies study programme: Possible elective subject
12	Language:
	German

Elec	tive Modul	e: Electronics	and Automation	n Techno	ology				WM	
Ident numl	tification ber:	Workload:	Credits:	Study	semester:		Frequency of the offer		Duration	n:
9021	1	150 h	5 5th seme		or 6th		each semester		1 semester	
1	Course:		Planned group s	sizes	Scope	2)	Actual c / classro teaching		Self-study	I
	Lecture		60 students			SCH		h		h
	Tuition in	seminars	30 students			SCH		h		h
	Exercise		20 students			SCH		h		h
	Practical of	or seminar	15 students		0	SCH	0	h	0	h
	Supervise	d self-study	60 students			SCH		h		h
2	Learning	outcomes/comp	petences:		•		•	•		•
3	Contents:									
4	Forms of	teaching:								
5	Participat	ion requiremen	ts:							
	Formal:									
	Content:									
6	Forms of	assessment:								
7	Prerequisi	ite for the awar	d of credit points:							
8	Application	on of the modul	e (in the following	g study pr	ogramn	nes)				
		l Engineering								
9	Importance	ce of the grade	for the final grade:							
10		oordinator:								
		-Ing. Rüdiger	Schultheis							
11	Other info	ormation:								
12	Language	:								
	German									

Elec	Elective Module: Energy and Drive Technology							WM			
	Identification Workload: number:		Credits:		Study	semeste	er:	Frequency of the offer		Duration:	
9022	9022 150			5 51 se		h or 6th mester		Annual (Winter)		1 semester	
1	Course:		Planned group sizes		zes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture		60	students			SCH		h		h
	Tuition in seminars		30	30 students			SCH		h		h
	Exercise		20	students			SCH		h		h
	Practical or seminar Supervised self-study		15	15 students		0	SCH SCH	0	h h	0	h
			60 students								h
2	Learning outcomes/competences:							•			
3	Contents:										
4	Forms of	teaching:									
5	Participati	ation requirements:									
	Formal:										
	Content:										
6	Forms of assessment:										
7	Prerequisite for the award of credit points:										
8	Application of the module (in the following study programmes)										
	Electrical Engineering B.Eng.										
9	Importanc	e of the grade	for th	ne final grade:							
10		oordinator:									
		-Ing. Rüdige	r Sch	ultheis							
11	Other info	ormation:									
12	Language	:									
	German										

Mat	erials in El	ecuicai Engii	leering and Elect	romes					WE		
Iden num	tification ber:	Workload:	Credits:	Stud	Study semester:			Frequency of the offer		on:	
127	9	150 h	5	1st s	1st sem.		Annual (Winter)		1 sem	1 semester	
1	Course:		Planned group	sizes	Scop	e	Actual / classr teachin		ne Self-stu	dy	
	Lecture		60 students		2 SCH		30 h		45	h	
	Tuition in seminars Exercise		30 students		1	SCH	15	h	22.5	h	
			20 students		0	SCH	0	h	0	h	
		or seminar	15 students		1	SCH	15	h	22.5	h	
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h	
	- Bas	g techno	logies	rmination	als						
2	their Con the i	r areas of app npetence to es materials used lity to determ	lication stablish the relati	onships	betwee	n the pro	operties of				
3	their - Conther - Abi Contents: - Stru - Met - Diel - Mag	r areas of app npetence to es materials used lity to determ	lication stablish the relation. It is the relation of the electrical parameter of materials and the electrical parameters of materials.	onships	betwee	n the pro	operties of	electron			
3	- Contents: - Abi Contents: - Stru - Met - Diel - Mag - Sem Forms of	r areas of app npetence to es materials used lity to determ acture and pro- callic material dectric material gnetic material niconductors teaching:	lication stablish the relation. It in electrical paraperties of materials als	onships	betwee	n the pro	operties of	electron			
4	their - Con the r - Abi Contents: - Stru - Met - Diel - Mag - Sem Forms of Lecture,	r areas of approper areas of approper to estimate its used lity to determine the current and proper allic material electric material elect	lication stablish the relation. It in electrical paraperties of materias als als ctical course	onships	betwee	n the pro	operties of	electron			
4	their Contents: Abi Contents: Stru Met Diel Mag Sem Forms of Lecture, Participat	r areas of approper appropries to estimate its used lity to determine turns and proper allic material dectric material dectri	lication stablish the relation. It is the relation of the rel	onships	betwee	n the pro	operties of	electron			
4 5	their - Contheir - Abi Contents: - Stru - Met - Diel - Mag - Sem Forms of Lecture, Participat Formal: Contents:	r areas of appringer areas of appringer and successive and programmer and program	lication stablish the relation. It is the relation of the rel	onships	betwee	n the pro	operties of	electron			
4 5	their - Contheir - Abi Contents: - Stru - Met - Diel - Mag - Sem Forms of Lecture, Participat Formal: Content: Forms of	r areas of approper appropriate to estable to determine the total determine the true and proper allic material deteric material determine determ	lication stablish the relation. It is the relation of the rel	ameters als	betwee	n the pro	operties of	electron			
4 55 66	their Contents: Stru Stru Met Sem Forms of Lecture, Participat Forms of Written	r areas of approper appropriate to estable to determine the total determine the true and proper allic material deteric material determine deter	lication stablish the relation. It is the relation of the rela	ameters als	betwee	n the pro	operties of	electron			
4 55 66	their Contents: Abi Contents: Stru Met Diel Mag Sem Forms of Lecture, Participat Formal: Content: Forms of Written of	r areas of approper areas of approper approper to estimate its used lity to determine the current and proper allic material electric mater	lication stablish the relation. It in electrical parameters of materias als als etical course ats: e e e each with prelimed of credit points:	inary ex	of vario	n the pro	operties of	electron			
4 5 6	their Contents: Abi Contents: Stru Met Diel Mag Sem Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequis Module	r areas of approper areas of approper and proper and proper allic materials dectric	lication stablish the relation. It in electrical parameters of materials als etical course electrical electrical course electrical el	inary ex	betwee of various aminat	n the proous passion	operties of	electron			
4 5 6	their Contents: Abi Contents: Stru Met Diel Mag Sem Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequis Module Applicati	r areas of approper areas of approper and a second and proper allic materials dectric materials dectri	lication stablish the relation. It in electrical parameters of materials als als als als als als als als als	inary ex	betwee of various aminat	n the proous passion	operties of	electron			
4 5 6 7	their Contents: Abi Contents: Stru Met Diel Mag Sem Forms of Lecture, Participat Formal: Content: Forms of Written Prerequis Module Applicati Electrica	r areas of approper areas of approper and successful to determine the current and proper allic material and allic material and area and ar	lication stablish the relation. It in electrical parameters of materials als als etical course etics: e e each with preliming of credit points: pass with preliming B.Eng.	inary exa	betwee of various aminat	n the proous passion	operties of	electron			
4 5 6 7	their Contents: Stru Stru Met Sem Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequis Module Applicati Electrica	r areas of approper areas of approper and successful to determine the current and proper allic material and allic material and area and ar	lication stablish the relation. It in electrical parameters of materials als als als als als als als als als	inary exa	betwee of various aminat	n the proous passion	operties of	electron			
4 5 7 8 9	their Contents: Abi Contents: Stru Met Diel Mag Sem Forms of Lecture, Participat Formal: Content: Forms of Written of Prerequis Module Applicati Electrica Important accordin Module of	r areas of approper areas of approper and proper and proper allic materials dectric materials decided and conductors decided and assessment: Non	lication stablish the relation. It in electrical parameters of materials als als etical course electrical electrical course electrical electrica	inary exa	betwee of various aminat	n the proous passion	operties of	electron			
4 5 6 7 8 9	their Contents: Abi Contents: Stru Met Diel Mag Sem Forms of Lecture, Participat Formal: Content: Forms of Written of Written of Applicati Electrica Important accordin Module of Prof. Dr.	r areas of approper areas of approper and proper allicy to determine the current and proper allic materials dectric materials decided by a consideration of the modulation of the modulation of the modulation of the grade of the grade g	lication stablish the relation. It in electrical parameters of materials als als etical course electrical electrical course electrical electrica	inary exa	betwee of various aminat	n the proous passion	operties of	electron			
	their Contents: Abi Contents: Stru Met Diel Mag Sem Forms of Lecture, Participat Formal: Content: Forms of Written Prerequis Module Applicati Electrica Important accordin Module of Prof. Dr. Other info	r areas of approper areas of approper and proper allicy to determine the current and proper allic materials dectric materials decided by a seminar, praction requirement and proper decided by a seminar proper decided decide	lication stablish the relation. It in electrical parameters of materials als als als actical course ats: e e e each with preliming of credit points: bass with preliming B.Eng. for the final grade: elke	inary exangry study p	amination	ion on nes)	operties of	electron			
4 5 6 7 8 9	their Contents: Abi Contents: Stru Met Diel Mag Sem Forms of Lecture, Participat Formal: Content: Forms of Written Prerequis Module Applicati Electrica Important accordin Module of Prof. Dr. Other info	r areas of approper appropries to estimate and proper allic materials dectric materials decided by the seaminar, practice of requirements decided and the seamination; deceived the grade of the gr	lication stablish the relation. It in electrical parameters of materials als als etical course electrical electrical course electrical electrica	inary exangry study p	amination	ion on nes)	operties of	electron			

	d Turbines								WEA				
Identification Wor		Workload:	rkload: Credits:		Study semester:			Frequency of the offer		Duration:			
1288		150 h	5	5th s	sem.		Annual (Winter)		1 semester				
1	Course:		Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study				
	Lecture		60 students		3	SCH	45	h	45	h			
	Tuition in seminars		30 students		1	SCH	15	h	45	h			
	Exercise		20 students		0	SCH	0	h	0	h			
	Practical	or seminar	15 students		0	SCH	0	h	0	h			
	Supervise	ed self-study	60 students		0	SCH	0	h	0	h			
2	_	outcomes/comp			_[1						
			ale, students can		.1	,•							
			es of fluid mecha					bines,					
			uate the differen	_		inverter	concepts						
			ne potential of w			fficiones	7						
	- design	- design wind turbines and calculate their economic efficiency.											
3	Contents:												
	Origin o	f wind, fluid n	nechanics basics	Origin of wind, fluid mechanics basics, potentials of wind energy systems, lift									
	and drag rotors; small wind systems, inverter and generator concepts, system												
	and drag	rotors; small	wind systems, ir	-									
	_	rotors; small grid connection	•	-									
	design, g Dimensi	grid connection oning of plant	n conditions. s and equipment	nverter a	nd gen	erator co	ncepts, sy	stem					
	design, g Dimensi	grid connection oning of plant	n conditions.	nverter a	nd gen	erator co	ncepts, sy	stem					
	design, g Dimensi	grid connection oning of plant	n conditions. s and equipment	nverter a	nd gen	erator co	ncepts, sy	stem					
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	design, g Dimensi	grid connection oning of plant	n conditions. s and equipment	nverter a	nd gen	erator co	ncepts, sy	stem					
4	design, g Dimensi calculati	grid connection oning of plant ons, potential	n conditions. s and equipment	nverter a	nd gen	erator co	ncepts, sy	stem					
4	design, g Dimensi calculati	grid connection oning of plant ons, potential teaching:	n conditions. s and equipment determination.	, power	nd gen	erator co	ncepts, sy	stem					
	design, g Dimensi calculati Forms of Lectures	grid connection oning of plant ons, potential teaching: and exercises	n conditions. s and equipment determination.	, power	nd gen	erator co	ncepts, sy	stem					
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5	Forms of Lectures Participat Formal: Content: Forms of Written of Prerequis	teaching: and exercises ion requirement None Elect assessment: examination ite for the award	a conditions. s and equipment determination. s or term papers of the condition of credit points:	or semin	ar pres	entation erials of	nicepts, sy nic efficient	ncy Engineerir		duction t			
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5	Forms of Lectures Participat Formal: Content: Forms of Written of Prerequis Module of Application	teaching: and exercises ion requirement Rone Elect assessment: examination ite for the award examination pon of the modul	n conditions. s and equipment determination. s or term papers of ts: e trical Engineerin trical Power Eng d of credit points: tass and course a le (in the following	or semin	ar pres	entation erials of , Electri	nicepts, sy nic efficient	ncy Engineerir		duction t			
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5 6 7 8	Forms of Lectures Participat Formal: Content: Forms of Written of Prerequis Module Application Electrica Important according	teaching: and exercises ion requiremen None Elect examination ite for the aware examination pon of the modul al Engineering ce of the grade to g to BRPO	n conditions. s and equipment determination. s or term papers of ts: e trical Engineerin trical Power Eng d of credit points: tass and course a le (in the following B.Eng.	or semin	ar pres	entation erials of , Electri	nicepts, sy nic efficient	ncy Engineerir		duction			
5 6 7 8	Forms of Lectures Participat Formal: Content: Forms of Written of Prerequis Module of Application Electrical Important accordin Module of Contents	teaching: and exercises ion requiremen Rone Elect examination ite for the aware examination pon of the modul al Engineering ce of the grade to	n conditions. s and equipment determination. s or term papers of ts: e trical Engineerin trical Power Eng d of credit points: tass and course a le (in the following B.Eng.	or semin	ar pres	entation erials of , Electri	nicepts, sy nic efficient	ncy Engineerir		duction			
5 6 7	Forms of Lectures Participat Formal: Content: Forms of Written of Prerequis Module Application Electrica Important according	teaching: and exercises ion requirement None Elect assessment: examination ite for the aware examination pon of the modulal Engineering ce of the grade to g to BRPO oordinator:	n conditions. s and equipment determination. s or term papers of ts: e trical Engineerin trical Power Eng d of credit points: tass and course a le (in the following B.Eng.	or semin	ar pres	entation erials of , Electri	nicepts, sy nic efficient	ncy Engineerir		duction			

	Schlabbach: Netzanschluss erneuerbarer Energiequellen, Schriften aus Lehre und Forschung an der FH-Bielefeld Nr. 26; Gasch, Twele: Windkraftanlagen, BG-Teubner-Verlag; Just, Hormann, Schlabbach: Netzrückwirkungen, VWEV-Energieverlag; Further literature will be announced at the beginning of the course.
12	Language:
	German

State	e Space Co	ntrol							ZRG	
Ident numb	rification per:	Workload:	Credits: Stud		tudy semester:		Frequency of the offer		Duration:	
1287			5 5th s		sem.		Annual (Winter)		1 semester	
1	Course: Lecture Tuition in seminars		Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study	
			60 students		2	SCH	30	h	45	h
			30 students		1	SCH	15	h	22.5	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical of	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
2	Learning outcomes/competences: Building on the basic knowledge of control and automation technology, students learn both the description and analysis of linear, time-invariant systems in state space and the design of linear state controllers and linear state observers.									
3	Contents: - Description of linear single- and multi-variable systems in the state space - Structural system properties: Controllability, observability - Controller design by means of pole presetting - Design of state observers									
4	Forms of	teaching:	nying seminar ex	ercises	and pra	eticals.				
5		ion requirement	s:							
	Formal:	;								
	Content:		matic Control En	gineerii	ng (123	35), Auto	omation E	ngineering	(1015)	
6	Forms of assessment:									
	Oral examination; in each case with preliminary examination									
7	Prerequisite for the award of credit points:									
0	Module examination pass with preliminary examination Application of the module (in the following study programmes)									
8		Application of the module (in the following study programmes) Floatrical Engineering R Eng. Engineering Computer Sciences R Eng. and Repoweble Energies								
	Licentea	Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng. and Renewable Energies								
	B Eno	Importance of the grade for the final grade:								
9	_		for the final grade:							
	Importance according	g to BRPO	for the final grade:							
9	Importance according Module co	g to BRPO pordinator:								
10	Importance according Module con Prof. Dr.	g to BRPO oordinator: -Ing. Dirk We								
	Importance according Module con Prof. Dr. Other info	g to BRPO pordinator: -Ing. Dirk We prmation:	idemann	nning	of the co	Ollrse				
10	Importance according Module con Prof. Dr. Other info	g to BRPO coordinator: -Ing. Dirk We ormation: e will be anno		nning o	of the co	ourse.				