Appendix A: Course Schedule

for the study programme Apparative Biotechnology B.Sc. (six semesters)

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

First sem	First semester					P/S	SSS	СР
Module number	Module title	Module ID						
1039	Chemistry	СН	2	1	0	1	0	5
1073	Electrical Engineering 1	ET1	2	1	0	1	0	5
1106	Computer Science 1 – Imperative Programming	IN1	2	1	0	1	0	5
1129	Construction Basics	KG	2	1	0	1	0	5
1149	Mathematics 1	MA1	2	2	0	0	0	5
1177	Molecular Biology of the Cell	MBZ	0	2	2	0	0	5
				-	-	Tota	I CP:	30
Second s	semester		L	ST	E	P/S	SSS	СР
Module number	Module title	Module ID						
1033	Biotechnology 1	BT1	0	2	2	0	0	5
1063	Electronics	EL	2	1	0	1	0	5
1110	Computer Science 2 – Object- Oriented Programming	IN2	2	1	0	1	0	5
1155	Mathematics 2	MA2	2	2	0	0	0	5
1319	Physics	PHY	2	1	0	1	0	5
1204	Practical Course Biotechnology 1	PB1	0	0	0	4	0	5
						Tota	I CP:	30
Third ser	nester		L	ST	E	P/S	SSS	СР
Module number	Module title	Module ID						
1034	Biotechnology 2	BT2	0	2	2	0	0	5
1326	Chemistry 2	CH2	0	2	1	1	0	5
1160	Mathematics 3	MA3	2	2	0	0	0	5
1168	Metrology	MT	2	1	0	1	0	5
1205	Practical Course Biotechnology 2	PB2	0	0	0	4	0	5
1216	Project	PR	0	0	0	2	0	5
						Tota	I CP:	30
Fourth se	emester	-	L	ST	E	P/S	SSS	СР
Module number	Module title	Module ID						
1027	Business Administration	BWL	3	1	0	0	0	5
1035	Biotechnology 3	BT3	0	2	2	0	0	5
1206	Practical Course Biotechnology 3	PB3	0	0	0	4	0	5
1234	Automatic Control Engineering	RT	2	1	0	1	0	5
1263	Technical English	TEN	0	4	0	0	0	5

9020	Elective Module: Apparative Biotechnology	WM				0		5
						Tota	I CP:	30
Fifth sem	nester		L	ST	E	P/S	SSS	СР
Module number	Module title	Module ID						
1005	Applied Biotechnology	ABI	0	2	0	2	0	5
1029	Machine Vision	BIL	2	1	0	1	0	5
1036	Biotechnological Detection Systems	BDS	0	2	1	1	0	5
1208	Practical Project / Internship	PRP	0	0	0	2	0	5
1211	Product Purification	PDA	0	2	1	1	0	5
9020	Elective Module: Apparative Biotechnology	WM				0		5
						Tota	I CP:	30
Sixth ser	nester		L	ST	E	P/S	SSS	СР
Module number	Module title	Module ID						
1004	Analytics and Process Control	APK	0	2	1	1	0	5
1291	Bachelor Thesis	BA	0	0	0	0	0	12
1290	Colloquium	KOL	0	0	0	0	0	3
9020	Elective Module: Apparative Biotechnology	WM				0		5
9020	Elective Module: Apparative Biotechnology	WM				0		5
						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 N	Elective Modules Apparative Biotechnology											
Module number	Module title	Module ID	W/ S	L	ST	E	P/S	SSS	СР			
1032	Biogas and Biorefineries	BIO	W	2	2	0	0	0	5			
3135	Gender and Diversity: Success Factors for Companies	GUD	W	2	2	0	0	0	5			
1232	Integrated Product Development	IP	S	2	2	0	0	0	5			
1309	Photonics	РНО	S	2	0	1	1	0	5			
1229	Quality Management	QM	S	2	2	0	0	0	5			
1240	Robotics	ROB	W	2	1	0	1	0	5			
6004	Textile Technologies	TEX	S	2	2	0	0	0	5			

Appendix B: Course Schedule

for the study programme Apparative Biotechnology B.Sc. (seven semesters)

First sem	ester		L	ST	E	P/S	SSS	СР
Module number	Module title	Module ID						
1039	Chemistry	СН	2	1	0	1	0	5
1073	Electrical Engineering 1	ET1	2	1	0	1	0	5
1106	Computer Science 1 – Imperative Programming	IN1	2	1	0	1	0	5
1129	Construction Basics	KG	2	1	0	1	0	5
1149	Mathematics 1	MA1	2	2	0	0	0	5
1177	Molecular Biology of the Cell	MBZ	0	2	2	0	0	5
						Tota	I CP:	30
Second s	emester		L	ST	E	P/S	SSS	СР
Module number	Module title	Module ID						
1033	Biotechnology 1	BT1	0	2	2	0	0	5
1063	Electronics	EL	2	1	0	1	0	5
1110	Computer Science 2 – Object- Oriented Programming	IN2	2	1	0	1	0	5
1155	Mathematics 2	MA2	2	2	0	0	0	5
1319	Physics	PHY	2	1	0	1	0	5
1204	Practical Course Biotechnology 1	PB1	0	0	0	4	0	5
						Tota	I CP:	30
Third ser	nester		L	ST	E	P/S	SSS	СР
Module number	Module title	Module ID						
1034	Biotechnology 2	BT2	0	2	2	0	0	5
1326	Chemistry 2	CH2	0	2	1	1	0	5
1160	Mathematics 3	MA3	2	2	0	0	0	5
1168	Metrology	MT	2	1	0	1	0	5
1205	Practical Course Biotechnology 2	PB2	0	0	0	4	0	5
1216	Project	PR	0	0	0	2	0	5
						Tota	I CP:	30
Fourth se	emester		L	ST	Е	P/S	SSS	СР
Module number	Module title	Module ID						
1027	Business Administration	BWL	3	1	0	0	0	5
1035	Biotechnology 3	BT3	0	2	2	0	0	5
1206	Practical Course Biotechnology 3	PB3	0	0	0	4	0	5
1234	Automatic Control Engineering	RT	2	1	0	1	0	5
1263	Technical English	TEN	0	4	0	0	0	5

9020	Elective Module: Apparative Biotechnology	WM				0		5
		1				Tota	I CP:	30
Fifth sen	nester		L	ST	Е	P/S	SSS	СР
Module number	Module title	Module ID	-					
1005	Applied Biotechnology	ABI	0	2	0	2	0	5
1029	Machine Vision	BIL	2	1	0	1	0	5
1036	Biotechnological Detection Systems	BDS	0	2	1	1	0	5
1208	Practical Project / Internship	PRP	0	0	0	2	0	5
1211	Product Purification	PDA	0	2	1	1	0	5
9020	Elective Module: Apparative Biotechnology	WM				0		5
						Tota	I CP:	30
Sixth ser	nester		L	ST	Е	P/S	SSS	СР
Module number	Module title	Module ID						
1004	Analytics and Process Control	APK	0	2	1	1	0	5
1305	Practical Project / Internship	PRA	0	0	0	0	0	15
9020	Elective Module: Apparative Biotechnology	WM				0		5
9020	Elective Module: Apparative Biotechnology	WM				0		5
					1	Tota	I CP:	30
Seventh	semester	F	L	ST	E	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
1305	Practical Project / Internship	PRA	0	0	0	0	0	15
						Tota	I CP:	30
Eighth se	emester		L	ST	E	P/S	SSS	СР
Module	Module title	Module						
Harriser						0		
				1	1	Tota	CP:	0
Ninth se	mester		L	ST	E	P/S	SSS	СР
Module number	Module title	Module ID						
								0
1						iota	I UP:	0

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 Apparative Biotechnology										
Module number	Module title	Module ID	W/ S	L	ST	E	P/S	SSS	СР		
1032	Biogas and Biorefineries	BIO	W	2	2	0	0	0	5		
3135	Gender and Diversity: Success Factors for Companies	GUD	W	2	2	0	0	0	5		
1232	Integrated Product Development	IP	S	2	2	0	0	0	5		
1309	Photonics	РНО	S	2	0	1	1	0	5		
1229	Quality Management	QM	S	2	2	0	0	0	5		
1240	Robotics	ROB	W	2	1	0	1	0	5		
6004	Textile Technologies	TEX	S	2	2	0	0	0	5		

Appendix C: Module catalogue

for the study programme Apparative Biotechnology B.Sc.

Analytics and Process Control*	
Applied Biotechnology*	
Bachelor Thesis	20
Business Administration	21
Machine Vision	
Biogas and Biorefineries*	23
Biotechnology 1*	
Biotechnology 2*	25
Biotechnology 3*	
Biotechnological Detection Systems*	
Chemistry*	
Chemistry 2*	
Electronics	
Electrical Engineering 1	
Gender and Diversity: Success Factors for Companies	
Computer Science 1 – Imperative Programming	
Computer Science 2 – Object-Oriented Programming	
Integrated Product Development	41
Colloquium	
Construction Basics	43
Mathematics 1	45
Mathematics 2	46
Mathematics 3	47
Measuring Technology	
Molecular Biology of the Cell*	
Photonics	
Physics	
Practical Course Biotechnology 1*	54
Practical Course Biotechnology 2*	
Practical Course Biotechnology 3*	
Practical Project / Internship	
Student Research Project*	
Product Purification*	

Project*	60
Quality Management	61
Automatic Control Engineering	63
Robotics	64
Technical English	66
Textile Technologies	68
Elective Module: Apparative Biotechnology	69

*Translations of these module descriptions are currently not available.

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Bach	elor Thesis	8							BA	
Identi numb	fication er:	Workload:	Credits:	Study	semest	er:	Frequency offer	y of the	Duratio	on:
1291		360 h	12	6th seme	or ster	7th	each sem	nester	12 we	eks
1	Course:		Planned group si	izes	Scope	2	Actual of time / classroo	contact	Self-stuc	ły
	Lecture		60 students		0	SCH	0	h	360	h
	Tuition in	seminars	30 students		0	SCH	0	h	0	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical of	Practical or seminar 15 students		0	SCH	0	h	0	h	
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
3	task from his/her special 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.									
	The bach technolog as a writt	elor thesis is gy task. It sho en paper.	usually an indepe ould deal with the	endent in topic in	detaile	ation wit d descri	th an engir ptions and	eering scie explanatio	nce or en ns and be	gineering prepared
4	Forms of	teaching:								
5	Participati	ion requiremer	nts:							
	Formal:	Non	e							
	Content:	Coo	rdinated topic from	m the st	udent's	special	subject ar	ea		
6	Forms of a	assessment:								
7	Prerequisi	te for the awar	rd of credit points:							
8	Application Apparation B.Eng., Industria	on of the modu ve Biotechno Mechanical I Engineering	le (in the following blogy B.Sc., Elec Engineering B.E g and Managemen	study pr ctrical E ing., Mo t B.Sc.	ogramn Enginee echatro	nes) pring B. nics B.	Eng., Eng Sc., Rene	ineering C wable Ene	omputer ergies B.I	Sciences Eng. and
9	Importanc	e of the grade	for the final grade:							
	according	g to BRPO								
10	Module co	oordinator:	71							
	Prof. Dr.	Ing Anton k	(104							
1.1	041	-mg. Anton I	Niar							
11	Other info	ormation:	Nai	inni	fthe					
11	Other info	ormation: e will be anno.	ounced at the begin	inning c	of the co	ourse.				

Busin	ness Admi	nistration							BWL		
Identi	fication	Workload:	Credits:	Study	semest	er:	Frequency	of the	Duratio	on:	
1027		150 h	5	2nd seme	or ster	4th	Annual (Summer)	1 sem	ester	
1	Course:	I	Planned group si	izes	Scope	e	Actual c /classroo	contact time om teaching	Self-stue	Self-study	
	Lecture		60 students		3	SCH	45	h	67.5	h	
	Tuition in	seminars	30 students		1	SCH	15	h	22.5	h	
					-		10				
	Exercise20 students0SCH0h				h	0	h				
	Practical	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/comr	etences:								
	success criteria of economic action in order to be able to classify their engineering activities in a business management context and to evaluate the economic consequences of their activities. The students master methods and tools for problem solving in selected corporate functional areas. They can apply business management instruments and calculation methods in a target-oriented manner and assess their effects.										
3	Contents:										
	- Cla	ssification, de	velopment and b	asic con	cepts of	of busine	ess admini	stration			
	- Bas	sic concepts of	business admini	istration	/ basic	princip	les of ecor	nomic actio	n 		
	- Ove	erview of the	entrepreneurial fu	inctiona	l areas	of the g	goods econ	omy, finan	cial and		
	info	ormation level		C.	/ 1	~					
	- Coi	porate goals a	ind corporate key	/ figures	/ key 1	figure sy	/stems				
	- Bas	sic concepts of	private and com	imercial	law						
	- Coi	porate legal f	orms								
4	Forms of	teaching:									
	Lecture,	seminar-based	teaching with c	ase stud	ies and	examp	les				
5	Farticipat	Ion requirement	ts:								
	Formar:	None	; 								
6	Forms of	assessment:	;								
0	Written e	examination of	combination exan	nination	perfo	rmance	examinatio	on or oral e	xaminatio	าท	
7	Prerequisi	ite for the award	d of credit points:		, perro			, , , , , , , , , , , , , , , , , , ,			
	Module e	examination p	ass								
8	Applicatio	on of the modul	e (in the following	study pr	ogramn	nes)					
	Apparative Biotechnology B.Sc. and Mechatronics B.Sc.										
9	Importance	ce of the grade f	for the final grade:								
	according	g to BRPO									
10	Module co	oordinator:									
	Prof. Dr.	rer. pol. Hube	ertus Wameling								
11	Other info	ormation:	unad at the head	innin	f the	01140 -					
12	Literatur	e will be anno	bunced at the begi	mmng o	i ine c	ourse.					
12	German	•									

Macl	nine Visior	1							BIL	
Identi	fication	Workload:	Credits:	Study	semest	er:	Frequency	of the	Duratio	on:
1029	ci.	150 h	5	5th s	emeste	r	Annual (V	Winter)	1 seme	ester
1	Course:		Planned group s	izes	Scope	e	Actual co / classroo teaching	ontact time	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	Exercise 20 students 0 SCH 0 h 0				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
2	Learning	outcomes/comp	etences:			1	1	1		
	Name and explain the basic concepts, elementary connections and laws of machine vision. Demonstrate and apply the basic descriptive tools and analysis methods of machine vision. Name the current areas of application. Grasp and interpret the practical significance of machine vision. Be able to develop independent solutions in simple areas of application of machine vision.									
3	Contents: Historical overview and current developments in machine vision, sensor systems for image data acquisition, basics of technical optics for the acquisition of scenes, illumination and object positioning, programming systems, handling machine vision programs, LUT and grey value programming, contour analysis and edge detection, filters in the spatial and frequency range, morphology, template matching, colour image processing, applications of machine vision as a quality assurance tool, biotechnological and medical applications, designing vision systems for process monitoring.								nage data ositioning, g, contour matching, nnological	
4	Forms of	eaching:								
	Lecture,	practicals and	exercises							
5	Participati	on requirement	s:							
	Formal:	None								
	Content:	None								
6	Forms of a	assessment:								
	Written e	examination, c	ombination exar	nination	, perfo	rmance	examinatio	n or oral e	xaminatio	on
7	Prerequisi	te for the award	of credit points:							
~	Module e	examination pa	ass and course as	ssessme	nt					
8	Applicatio	on of the module	e (in the following	study pr	ogramn	nes)	36.1.	· D.C	1 7	
	Apparati	ve Biotechnol	bgy B.Sc., Elect	rical Eng	gineeri	ng B.En	g., Mechati	conics B.Sc	c. and Inc	lustrial
0	Engineer	ing and Mana	gement B.Sc.							
9	according	to BPDO	or the fillar grade.							
10	Module or	ordinator:								
10	Prof Dr	Ing Reinhard	Kaschuba							
11	Other info	img. Remnard	ixasenaba							
11	Literatur	e will be anno	unced at the beg	inning o	f the c	ourse.				
12	Language	:								
	German									



















Elect	ronics								EL	
Identi	fication	Workload:	Credits:	Study	semest	er:	Frequency	of the	Duration	1:
1063	er:	150 h	5	2nd s	emeste	er	Annual (S	lummer)	1 semes	ster
1	Course:		Planned group siz	zes	Scope	2	Actual co time / cla teaching	ontact assroom	Self-study	7
	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
2	Learning	outcomes/compe	etences:			1	ł	•	•	•
	In relation	on to the conte	nts listed below,	the stu	idents	use the	elementary	methods	of electron	nics and
	interpret	the correlatio	ons. They use the	ne mos	t impo	ortant co	omponents	and basic	c circuits	used in
	electron	cs. They can a	nalyse, design an	d evalu	ate bas	1c electi	conic circui	ts.	C . 1	• •
	As future	e mechatronics	real they can class	lotechn	ologist	s, they i	of the day	alopmont	and produ	onics in
	electroni	c systems and	assemblies	sily cs	sciitiai	aspects	of the dev	ciopinent	and produ	
	ciccuoin	e systems and	ussemenes.							
	~									
3	Contents:									
	- Passive	e components	:							
	- Fundar	nentals of sem	conductor physic	CS ular dic	dae an	d transi	store and th	oir basic c	irouite	
	- Operat	ional amplifier	s and their appli	rations	ues an	u u ansis	stors and th		incuits	
	- Basics	of digital and	analogue circuits	cutions						
	- Integra	ted Circuits/M	licroelectronics							
	- Electro	onics developm	ent and manufac	turing						
4	Forms of	teaching:								
~	Lecture,	seminar-based	teaching with ex	ercises	, practi	cal cour	se			
5	Formal	None								
	Content:	Electr	ical Engineering	1 (107	3)					
6	Forms of	assessment:		1 (107	5)					
0	Written e	examination or	oral examination	ı						
7	Prerequisi	te for the award	of credit points:							
	Module e	examination pa	ass and course ass	sessmer	nt					
8	Applicatio	on of the module	(in the following	study pr	ogramn	nes)				
	Apparati	ve Biotechnolo	bgy B.Sc. and Me	chatro	nics B.	Sc.				
9	Importance	te of the grade for	or the final grade:							
10	according Modulo a	g to BKPO								
10	Prof Dr	-Ing Andreas	Rünte							
11	Other info	ormation:	Build							
	Literatur	e will be annou	unced at the begin	nning o	f the co	ourse.				
12	Language	:	8	0 -						
	German									

										1	
Elect	rical Engir	neering 1								ET1	
Identi numb	fication er:	Workload	:	Credits:	Study	semest	er:	Frequency offer	of the	Duration	1:
1073		150 h		5	1st se	emester	:	Annual (Winter)		1 semester	
1	Course:		Pl	anned group s	sizes	Scope	9	Actual co / classroo teaching	ntact time m	Self-study	7
	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
2	In relation correlation can example design ar of study a	on to the c ons and lav ine given s ad impleme and to asse	ontents vs in teretups ent basi ss them	 listed belo chnical syste and dimension c electrotech 	w, the s ems. The on simpl- nnical bo	tudents ey can a e circui oundary	use an analyse, ts appro	d apply the design and priately. Stu ons for appl	e elementa evaluate I idents will lications ty	ry electro DC networ l be able to ypical of th	technical ks. They identify, ne course
3	Contents:										
	 Basic I Charge Resista Energy DC cir Series, Netwo: Magne Static a 	cnowledge e, current and ince and re v and powe cuits, coun parallel an rk calculati tic field, la and dynam	nd volta sistance r ting arr d bridg on w of in ic proce	age, electric e behaviour, row systems, ge circuit, vo duction, ind esses, sinusc	field, Co Ohm's l , Kirchho ltage and uctance, pidal exc	oulomb aw off's the d curre force e itation,	force, c eorems, nt divide effect in impeda	capacities ideal and re er the magnet: nce	al sources	orentz forc	ce
4	Forms of	teaching:		1							
	Lectures,	exercises,	practic	als							
5	Participati	on requirem	nents:								
	Formal:	N	one								
	Content:	N	one								
6	Forms of a	assessment:									
	written e	examination	n or ora	u examinatio	on						
7	Prerequisi	te for the av	vard of o	credit points:							
	Module e	examinatio	n pass a	and course a	ssessme	nt					
8	Applicatio	on of the mo	dule (in	the following	g study pr	ogramn	nes)				
	Apparati	ve Biotech	nology	B.Sc. and N	1echatro	nics B.	Sc.				
9	Importanc	e of the gra	de for th	e final grade:							
10	according	g to BRPO									
10	Module co	ordinator:	P."								
	Prot. Dr.	-Ing. Andr	eas Büi	nte							

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

Geno	ler and Div	versity: Succes	ss Factors for Con	npanies	5				GUD	
Identification number: Workload: Credits: Study semester: Frequency of the offer Duration										:
3135		150 h	5	5th se	emeste	emester Annual (Winter)			1 semester	
1	Course:	L	Planned group siz	lanned group sizes			Actual contact time /		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	d self-study	60 students		0	SCH	0	h	0	h
2	Learning	outcomes/comp	etences:			1		1	L	1
_	The stud	ents								
	Contentio	 know diver know Discr are so indep in the are a a as ge for p are fa diver for the 	w the terms, histor rsity/ diversity may v legal principles rimination Direction ensitised to huma bendently recogni- te business environ- ble to independen- inder mainstreami- rofessional practi- amiliar with select rsity management the implementation	y and d in agema in the c ive, Gen n hetero se stere nment. atly coll ing and ce. ted theo and, bu n of hol	lifferen ent. ontext neral E ogeneit cotypin ect rele divers ories au ilding istic di	of gend qual Tra- y in the g and ca evant in ity mana ad appro- on this, versity f	er and dive eatment Ac corporate of an develop i formation of agement and baches in th are able to managemen	der mainst rsity (e.g. t) context. ideas for p on establish d to assess e current c develop c tt in a corp	reaming an EU Anti- ossible cha ned concep their relev liscourse o onceptual i	nges ts such ance n ideas ext.
4	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 Equal 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 account in selected 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								es to). sity) into han	
5	Participati	ion requirement	s:							
-	Formal:									
1	Content.	None	1							
6	Forms of	assessment:								

	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

Com	puter Scier	nce 1 – Impera	tive Programmin	g					IN1	
Identi	Identification Workload: Credits: Study s						Frequency	of the	Duration	:
1106		150 h	5	1st se	emester		Annual (W	/inter)	1 semes	ter
1	Course:		Planned group siz	Planned group sizes			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 of	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
	The students are able to present algorithms independently of the programming language. They can independently create small programmes using the C programming language. They are able to understand C programmes written by others. The students know the basic elements of imperative programming and can apply them in programming. Students are familiar with the basic data types of imperative programming languages and are able to define composite data types.									
	0 1 1									
	Contents: Teaching content: - Formal basics of computer science (set theory, Boolean algebra, logic of statements, Turing machine, decidability, von Neumann architecture) - Algorithms and representation of algorithms - The programming language C and its standard libraries - Basic data types, composite data types and operators - Expression and instruction - Control structures of imperative programming (blocks, loops, conditional statement) - Functions, scopes and recursions									
4	Forms of	teaching:								
	Lecture,	seminar-based	teaching with ex	ercises	, practi	cal cour	se			
5	Participati	ion requirements	s:							
	Formal:	None								
	Content:	None								
6	Forms of	assessment:	ombination	inction	norf		avaminatio	on onel	aminatia	
7	Prerequisi	te for the award	of credit points:	mation	, perior	mance	examination	i or oral e	xammation	
	Module e	examination pa	ass and course ass	sessmer	nt)				
8	Applicatio	on of the module	e (in the following s	study pr	ogramn	ies)				
0	Apparati	ve Blotechnold	Dgy B.SC. and Me	ecnatro	IICS B.	SC.				
7	according	σ to BRPO	or the initial grade.							
10	Module co	ordinator.								
10	Prof. Dr.	rer. nat. Marti	n Hülse							
11	Other info	ormation:								
_	Literatur	e and other sou	arces will be anno	ounced	at the l	beginnir	ng of the cou	ırse.		
12	Language	:								

German

Com	puter Scier	nce 2 – Object	-Oriented Program	nming					IN2	
Identi numb	fication er:	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duration	:
1110		150 h	5	2nd s	emeste	r	Annual (S	ummer)	1 semes	ter
1	Course:		Planned group siz	Scope	2	Actual co / classroo teaching	ntact time m	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 of	or seminar	15 students		1	SCH	15	h	22.5	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
	implement and test them programmatically. Independently of a concrete programming language, they are able to apply the concepts of object-oriented programming in software development. The students are able to efficiently implement small software projects using the object-oriented programming paradigm with the programming language C++. They will be able to apply standard algorithms and data structures to concrete problems in software development and will be in a position to assess the efficiency of the programmes they have developed.									
	Teaching - A - C in - M - U - B - A	s content: bstract data ty oncepts of obj heritance) lodelling langu nit tests and te rief introductio lgorithms and	pe ect-oriented progr tage UML st-driven SW dev on to SW enginee data structures	rammir velopme ring (ic	ng (absi ent lioms, d	traction design I	, data encap patterns, arci	sulation, p	oolymorphi)	sm,
4	Forms of	teaching:								
~	Lecture,	seminar-based	teaching with ex	ercises	, practi	cal cour	se			
5	Participati	ion requirements	8:							
	Contant:	Com	utor Science 1							
6	Forms of	Comp	science i							
0	Writton	assessment.	ombination avam	ination	norfor	mance	examination	or oral or	vamination	
7	Prerequisi	te for the award	of credit points:	manon	, perio	mance	Chammation		ammation	L
/	Module	examination p	ass and course ass	esemer	nt					
8	Applicatio	on of the module	e (in the following e	study pr	ogramn	nes)				
0	Apparati	ve Biotechnolo	ogy B.Sc. and Me	chatro	nics R 2	Sc.				
9	Importanc	e of the grade for	or the final grade:							
	according	g to BRPO								
10	Module co	oordinator:								
	Prof. Dr.	rer. nat. Marti	n Hülse							
11	Other info	ormation:								
	Literatur	e and other sou	arces will be anno	ounced	at the l	beginnir	ng of the cou	irse.		

12	Language:
	German

Integ	rated Prod	uct Developr	nent						IP	
Identi	ification	Workload:	Credits:	Study	y semes	ter:	Frequency	y of the	Duration:	
numb 1232	er:	150 h	5	4th seme	4th or 6th semester		offer Annual (Annual (Summer)		ester
1	Course:	I	Planned group s	bizes	Scop	e	Actual of / classro teaching	contact time com	Self-stu	dy
	Lecture		60 students	2	SCH	30	h	45	h	
	Tuition in seminar		30 students		2	SCH	30	h	45	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	The students distinguish between different product development processes and know different development methods and tools. They can select and apply these methods in a targeted manner. They are able to solve a technical problem in a methodical, systematic, goal-oriented way and apply guiding rules for methodical development.									
	Contents: Methodical development of products (based on VDI 2206, 2221, 2222, among others) Planning, tasks, specifications/requirements list, development structuring -> Overall function, sub- functions, functional structure, Idea generation/creativity process -> Method overview, discursive and intuitive methods, evaluation of alternative solutions, evaluation procedures. Selected development guidelines (e.g. cost-conscious development, design in accordance with stresses)							n, sub- valuation onscious		
4	Forms of	teaching:								
	Lecture,	seminar-base	d teaching, practi	ical exer	cises					
5	Participati	ion requiremen	its:							
	Formal:	Non	e							
	Content:	Non	e							
6	Forms of	assessment:	1.1	• • •	C			1		
7	Prerequisi	examination,	combination examined of credit points:	mnatior	i, perfo	rmance	examination	on or oral e	xaminati	on
1	Module e	examination r	a or creat points.							
8	Applicatio	on of the modu	le (in the following	g study pi	rogrami	nes)				
	Apparati	ve Biotechno	logy B.Sc., Engir	neering	Compu	ter Scie	nces B.En	g., Mechani	cal Engi	neering
	B.Eng. a	nd Mechatror	nics B.Sc.							
9	Importanc	te of the grade	for the final grade:							
10	According Module of	g to BRPO								
10	Prof Dr	-Ing. Klaus F	lürkopp							
11	Other info	ormation:	ounced at the har	inning	of the e	ourse				
12	Language	e will be anno	Junceu at the deg	,mmig (n the c	ourse.				
12	German									

Colle	oquium								KOL	
Identi numb	ification	Workload:	Credits:	Study	/ semest	er:	Frequency offer	y of the	Duratio	n:
1290		90 h	3	6th seme	or ester	7th	each sem	nester		
1	Course:		Planned group si	Planned group sizes		2	Actual of / classro teaching	contact time com	Self-stud	y
	Lecture		60 students		0	SCH	0	h	90	h
	Tuition in seminars Exercise Practical or seminar		30 students		0	SCH	0	h	0	h
			20 students	20 students		SCH	0	h	0	h
			15 students		0	SCH	0	h	0	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
	candidate thesis, it reference	e is capable of s subject-relates, as well as a	orally presenting red foundations, ssessing its signi	and inc its int ficance	lepende erdiscij for pra	ently jus plinary ctice.	connection	e scientific to scientific to scientific to scientific to sci scientific to scientific to scientific to scientific to scientific	opic of the non-subje	e bachelor ect-related
3	Contents: - Contents - D th	ontent of the	hesis according t he procedure in he thesis	to the to the prep	pic paratior	of the	thesis and	the question	ns that arc	ose in
4	Forms of t Oral exam	teaching: nination for th	e bachelor thesis	8						
5	Participati	on requirement	s:							
	Formal:	None								
	Content:	Treat	ment of the bach	elor the	sis					
6	Forms of a	assessment:								
	Oral example	nination								
7	Prerequisi	te for the award	of credit points:							
8	Application Applied Engineer Renewab	on of the module Mathematics ing Computes the Energies B.	e (in the following B.Sc., Apparat r Sciences B.Et Eng. and Industr	study pr tive Bi ng., Me rial Eng	ogramn otechn echanic ineerin	nes) ology 1 al Eng g and N	B.Sc., Ele ineering l lanagemer	ectrical Eng B.Eng., Me nt B.Sc.	gineering echatronic	B.Eng., s B.Sc.,
9	Importance according	e of the grade for the grade f	or the final grade:							
10	Module co	oordinator:								
11	Prof. Dr.	-ing. Anton K	lar							
11	Literature	e will be annot	unced at the begi	inning c	of the co	ourse.				
12	Language	:	- 0	0						
	German									

Cons	truction B	asics								KG	
Identi	ification	Worklo	ad:	Credits:	Study	semest	er:	Frequency	of the	Duration	:
1129		150 h		5	1st se	emeste	r	Annual (Winter)		1 semes	ter
1	Course:	<u> </u>	Pl	Planned group sizes			e	Actual co / classroo teaching	ontact time om	Self-study	r
	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		r 15	5 students		1	SCH	15	h	22.5	h
	Supervise	d self-stu	dy 60) students		0	SCH	0	h	0	h
2	Learning The stuc represent	outcomes/ lents hav tation me	/competen ve a bas ethods, k	ces: ic knowledg now the bas	ge of m ics of st	aterials andard	s scienc	e as well dimensioni	as knowle	edge of te lerancing a	echnical and can
3	Independently create simple constructions and represent them in accordance with standards. The students master the use of a 3D CAD system and can independently create solids and assemblies as well as derive 2D drawings. They understand technical drawings and know different possibilities of construction analysis with the CAD system. Students can structure complex constructions independently and have mastered the basics of creating design documentation Contents: Standardisation. Drawing reading. Dimensional, shape and positional tolerances. Fits. Technical										
	design ar	nalysis									
4	Forms of	eaching:	prostia	000000							
5	Darticinet	ion requir	ementa	i course							
5	Formal	ion requir	None								
	Content:		None								
6	Forms of	assessmer	nt.								
U	Written 4	examinat	ion perfe	ormance exa	mination	or ora	lexami	nation			
7	Prereauisi	ite for the	award of	credit points:	mation	51 014	. examin	intion			
,	Module e	examinat	ion pass	and course a	ssessmei	nt					
8	Applicatio	on of the r	nodule (in	the following	g study pr	ogramn	nes)				
~	Apparati	ve Bioteo	chnology	B.Sc. and M	lechatro	nics B.	Sc.				
9	Importance	ce of the g	rade for th	ne final grade:							
10	Module c	oordinato	с г.	-							
	Prof. Dr.	-Ing. Her	rbert Fun	ke							
11	Other info Literatur Further 1	ormation: e: Hoisch iterature	nen: Tech will be a	nnisches Zeic nnounced at	chnen; La the begin	abisch: nning o	Techni of the co	sches Zeich urse.	nen, vario	us DIN sta	ndards

12	Language:
	German

Mat	nematics 1								MA1	
Ident numl	ification	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Durati	on:
1149)	150 h	5	1st se	emester	r	Annual (Winter)	1 sem	ester
1	Course:	<u> </u>	Planned group s	sizes	Scope Actual contact time / classroom teaching			Self-stu	dy	
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	n 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	ed self-study	60 students		0	SCH	0	h	0	h
3	mathematical problems can be solved independently. Students are able to apply the methods and procedures they have learned and their mathematical correlations to technical problems and to work out solutions to these problems.									
	- N - E - L - L - D - C - E - In	Sumber system Definition of fu imit value and mportant funct Complex numb Differentiating ntegration	and algebraic of inctions and curv continuity tional classes ares and their app a function and it	equation ves, basic blication ts rules, o	s, amou c terms curve d	unt equa	n			
4	- P	teaching:	lectifical issues							
4	Lecture	seminar-hase	d teaching with e	exercises						
5	Participat	tion requiremen	ts:		<u>, </u>					
-	Formal:	None	2							
	Content:	Knov	wledge of school	mathem	natics					
6	Forms of	assessment:								
	Written	examination, o	combination examination exam	mination	or ora	l examiı	nation			
7	Prerequis Module	ite for the awar examination p	d of credit points: bass							
8	Applicati Apparat	on of the modulive Biotechnol	e (in the following logy B.Sc. and N	g study pr Iechatro	ogramn nics B.	nes) Sc.				
9	Importan accordin	ce of the grade	for the final grade:							
10	Module c	oordinator:	umonn							
11	Prof. Dr	-ing. Koll Na	umann							
11	Literatur Papula.	e will be anno Mathematik fü	ounced at the beg ir Ingenieure und	ginning c 1 Naturw	of the co	ourse. chaftler.	Bd. 1und	Bd. 2		
12	Language German	2:				- ' 7				

Math	ematics 2								MA2	
Identi	fication	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duration	:
1155		150 h	5	2nd s	emeste	r	Annual (Su	ummer)	1 semes	ter
1	Course:		Planned group siz	zes	Scope	2	Actual co / classroot teaching	ntact time m	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 of	or seminar	15 students	students 0 SCH 0 h			0	h		
	Supervise	d self-study	60 students	idents 0 SCH 0 h 0					h	
2	Learning	outcomes/comp	etences:							
	Based or multidim The abili	the knowled ensional problety to think abs	ge acquired in M lems from techno tractly and the co	Aathema logy an ompeter	atics 1, d naturnice to f	the stural scient	idents can d ices using m tions are fur	lescribe a athematic ther deve	nd solve c cal methods loped.	omplex s.
3	Contents:									
5	- Basic concepts of vector algebra and applications in geometry									
	- Li	near algebra:	Calculator operat	tion wit	h vecto	rs and i	natrices			
	- Li	near systems	of equations and	eigenva	alue pro	blems	nutrees			
	- M	ultidimension	al differential cal	culus w	vith and	lication	IS			
	- In	tegration of re	tationally symmetry	etrical b	odies.	arc leng	rths.			
4	Forms of	teaching:	julionally symmetry		,		,,			
	Lecture,	seminar-based	l teaching with ex	rcises						
5	Participati	on requirement	s:							
	Formal:	None								
	Content:	Event	t Mathematics 1 ((1149)						
6	Forms of a	assessment:								
	Written e	examination, c	ombination exam	ination	or oral	examii	nation			
7	Prerequisi	te for the award	l of credit points:							
	Module e	examination pa	ass							
8	Applicatio	on of the module	e (in the following	study pr	ogramn	nes)				
0	Apparati	ve Biotechnol	ogy B.Sc. and Me	echatroi	nics B.	Sc.				
9	Importance of the grade for the final grade:									
10	Module of	g to BRPO								
10	Prof Dr.	Ing Rolf Nau	imann							
11	Other info	rmation.	1111a1111							
11	Literature	e will be annot re und Naturw	unced at the begi issenschaftler, Bo	nning o d. 1und	f the co Bd. 2	ourse. P	apula, Lotha	ır, Mathei	natik für	
12	Language	:								
	German									

Math	nematics 3								MA3	
Ident numb	ification	Workload:	Credits:	Study	v semest	er:	Frequency offer	of the	Duration	1:
1160)	150 h	5	3rd s	emeste	r	Annual (V	Winter)	1 semes	ster
1	Course:	1	Planned group s	izes	Scope	e	Actual co / classroo teaching	ontact time	Self-study	ý
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	seminars	30 students	30 students		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	d self-study	60 students		0	SCH	0	h	0	h
2	Learning The stud technical	outcomes/comp ents are able problems and	betences: to apply ordinary d to work out solu	y differe utions u	ential e sing va	quations rious m	s and their ethods.	mathemati	cal correla	ations to
	 Linear differential equations of 2nd order with constant coefficients Example from mechanics and electrical engineering Systems of linear differential equations with constant coefficient Solution with the help of eigenvalues and eigenvectors Numerical solution methods for non-linear differential equations Description of functions and DGL in the Laplace domain Introduction to Vector Analysis 									
4	Forms of	teaching:								
	Lecture,	seminar-base	d teaching with e	exercises						
5	Participat	ion requiremen	ts:							
	Formal:	Non	e							
	Content:	Mod	ule Mathematics	2 (1155)					
6	Forms of	assessment:								
	Written	examination,	combination exar	mination	or ora	l examin	nation			
7	Prerequis	ite for the awar	a of credit points:							
0	Applicati	examination p	ass le (in the following	r study or	Ogramo	165)				
0	Applicati	ve Biotechno	logy B Sc. and M	fechatro	nice R	Sc.				
9	Important	ce of the grade	for the final grade:	lechauo	ines D.	50.				
10	Modula a	g lo BRPO								
10	Prof Dr	-Ing Rolf Na	umann							
11	Other info	ormation:								
	Literatur Papula, I	e will be anno Lothar, Mathe	ounced at the beg matik für Ingenie	inning c eure und	of the co Natury	ourse. wissenso	chaftler, Bd	. 2 und Bd	l. 3	
12	Language German	:								

Meas	suring Tecl	hnology							MT	
Identi numb	fication er:	Workload:	Credits:	Study	semest	er:	Frequency	of the	Duratio	on:
1168		150 h	5	3rd s	emeste	r	Annual (V	Vinter)	1 seme	ester
1	Course:	L	Planned group size	zes	Scope	e	Actual co / classroo teaching	ontact time m	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
2	Describe select the uncertain features of	the basic desi e measuring n tties; determin of the develop	gn of measuring nethod suitable for ne possible distur ment of a compu-	equipm or the r bance ter-aide	ent and especti variabl d meas	d freque ve applies and souring sy	ntly used m ication cono select preca /stem for va	easuring r ditions; de utions to lue proces	nethods o etermine r reduce th ssing.	or sensors; neasuring em; basic
3	Contents: Principle of measurement, SI units, structure of technical measuring equipment, measurement errors, measurement uncertainties, disturbance variables and their reduction, analogue and digital signals, general aspects for the selection and use of transducers, time and frequency measurement, current, voltage and power measurement, length, angle and strain measurement, force, torque, temperature and pressure measurement methods, computer-assisted measurement for value processing.									
4	Forms of	teaching:								
	Lecture,	seminar-based	l teaching with ex	rcises	and pr	oject tas	sks, practica	al course		
5	Participati	ion requirement	s:							
	Formal:	None								
	Content:	None								
6	Forms of a Written e	assessment: examination. c	ombination exam	ination	, perfo	rmance	examinatio	n or oral e	xaminatio	on
7	Prerequisi	te for the award	l of credit points:	acome	nt .					
0	Applicatio	$\frac{1}{2}$	ass allu course as	study pr	nogramn	nes)				
0	Appreade	ve Biotechnol	ogy B Sc Mech	atronics	B Sc	and Indi	ustrial Engi	neering an	d Manag	ement
	B.Sc.	, Diotechnolog	557 D .50., WICCH	anomes	D.50.		asu iui Liigi	and and an	a manage	cincint
9	Importanc	e of the grade f	or the final grade:							
	according	g to BRPO								
10	Module co	oordinator:								
	Prof. Dr.	Dr. Andrea E	hrmann							
11	Other info	ormation: e will be anno	unced at the begi	nning o	of the co	ourse				
12	Language	:	uneed at the begi		- 110 0					
	German									



Photonics						РНО				
Identi	fication er:	Workload:	Credits:	Study	semest	er:	Frequency	of the	Duration	:
1309		150 h	5	4th seme	or ster	6th	Annual (S	ummer)	1 semes	ter
1	Course:		Planned group siz	zes	Scope	2	Actual co / classroo teaching	ontact time om	Self-study	,
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	seminars	30 students		0	SCH	0	h	0	h
							1.5		20	
	Exercise		20 students		1	SCH	15	h	30	h
	Practical of	or seminar	15 students		1	SCH	15	h	15	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
2	Learning of	outcomes/comp	etences:				•			
	and apply the basic means of description and methods of analysis, especially in light technology, laser technology and technical optics. Name the most important areas of application. Understanding the practical significance of photonics and developments driven by photonics. Identify, interpret and design interacting light-generating and light-directing components. Enable the development of independent solutions in application areas of photonics.									
	Contents: Historical overview and current developments in optics, definitions of terms, quantities, units, laws and standards. Spectral eye sensitivity and photometric radiation equivalent, geometric optics, wave optics, photometry, laser effect, holography and interferometry, simulation of optical beam paths, handling of optical laboratory systems. Applications in metrology, production technology, materials processing, biotechnology and medical technology.									
4	Forms of t	teaching:								
	Lecture,	exercise and p	ractical course							
5	Participati	on requirements	3:							
	Content:									
6	Forms of a	assessment:								
	Written e	examination, co	ombination exam	ination	, perfo	mance	examinatio	n, project v	work or ora	al
	examinat	ion						- •		
7	Prerequisi	te for the award	of credit points:							
-	Module e	examination pa	iss and course as	sessmer	nt					
8	Applicatio	on of the module	e (in the following only \mathbf{B} so and \mathbf{M}	study pro	$\operatorname{Dig}_{\mathbf{D}} \mathbf{P}$	ies)				
9	Importanc	e of the grade for	or the final grade.		nes D.	50.				
,	according	g to BRPO	grade.							
10	Module co	oordinator:								
	Prof. Dr.	-Ing. Reinhard	Kaschuba							
11	Other info	ormation:								
	The course	rse material i	s summarised in	n a lec	ture-ac	compar	iying scrip	t, an exer	cise catal	ogue, a
	the first 1	a of pictures at	iu a collection of	tormul	as. An	up-to-da	ate interatur	e review w	in be prese	ented in
	uie 1115t l	ceture nour.								

12	Language:
	German

Phys	ics								PHY	
Identi	fication	Workload:	Credits:	Study	semest	er:	Frequency	v of the	Duration	1:
1319	CI .	150 h	5	2nd s	emeste	er	Annual (Summer)	1 semes	ster
1	Course:	I	Planned group si	zes	Scope	9	Actual c / classro teaching	ontact time om	Self-study	ý
	Lecture		60 students		2	SCH	30	h	45	h
	Tuition in	seminars	30 students		1	SCH	15	h	30	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical of	or seminar	15 students		1	SCH	15	h	15	h
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
2	Learning outcomes/competences:						•			
	Explain	basic physic	cal processes a	nd law	's in	the fie	lds of m	echanics,	fluid me	chanics,
	thermodynamics, vibrations, optics and acoustics.									
	Scientific performance and analysis of experiments to verify theoretical facts.									
3	Contents:									
	Mechani	cs (kinematics	s: one and three-d	limensio	onal tra	nslation	n; dynamic	s: Newton's	axioms, c	different
	forces, v	work, energy	, power, mome	ntum. I	Fluid 1	nechani	cs (hydro	statics: pre	ssure, bu	oyancy;
	hydrodyr	namics: contin	uity equation, Be	ernoulli	equation	on, lami	nar and tur	bulent flow	, friction)	
	Thermodynamics (temperature, heat, thermal expansion, gas laws, internal energy, entropy, circular									
	processes	s, phase transi	tions).							
	Oscillatio	ons and waves	s (free damped ar	nd undai	nped o	scillatio	ons, forced	oscillations	s, superpo	sition of
	oscillatio	ns, harmonic	waves, Doppler e	effect, ir	nterfere	ence, dif	fraction).			
	Optics (g	eometric: refl	ection, refraction	, lenses	; wave	optics:	interferenc	e, diffractio	on).	
	Acoustic	s (sound wave	e, sound level, so	und spe	ctra, so	und pro	pagation).			
4	Forms of	teaching:								
	Lecture,	seminar-based	l teaching with e	xercises	and pr	oject ta	sks, practic	al course		
					•	·	-			
5	Participati	ion requirement	is:							
	Formal:									
(Content:	nanonamort.								
0	Writton	assessment:	r oral examinatio	n						
7	Prerequisi	te for the awar	of credit points	11						
'	Module e	examination p	ass and course as	sessmer	nt					
8	Applicatio	on of the modul	e (in the following	study pr	ogramn	nes)				
-	Apparati	ve Biotechnol	ogy B.Sc. and M	echatro	nics B.	Sc.				
9	Importanc	e of the grade f	or the final grade:							
	according	g to BRPO								
10	Module co	oordinator:								
	Prof. Dr.	Dr. Andrea E	hrmann							

 11
 Other information:

 12
 Language: German







Pract	tical Projec	ct / Internship							PRA	
Ident: numb	ification	Workload:	Credits:	Study	semest	er:	Frequency offer	of the	Duratio	on:
1305		900 h	30	7th s	emeste	r	each sem	ester	20 wee	eks
1	Course:	1	Planned group si	zes	Scop	e	Actual contact time / classroom teaching		Self-stuc	ły
	Lecture		60 students		0	SCH	0	h	900	h
	Tuition in	seminars	30 students		0	SCH	0	h	0	h
	Exercise		20 students		0	SCH	0	h	0	h
	Practical	or seminar	15 students		0	SCH	0	h	0	h
	Supervise	d selfstudy	60 students		0	SCH	0	h	0	h
3	projects and develop suitable solution strategies. The main aim is to teach and expand integration, analysis, problem-solving, presentation and communication skills.									
	The cont an engin of activi individu	ents result fro eering task. A ties and the ally and profes	om the field of act t the end of the pr students a final ssionally advised	tivity of actical report. by the	f the ch project During supervi	osen co , the sup g the pr sing un	mpany or o pervising co cactical pro- iversity lec	enterprise a ompany is oject, the s turers.	and should to prepare students a	d include a record are to be
4	Forms of	teaching:								
	Seminar	-based teachin	g with exercises	as accor	mpanyi	ng guid	ance			
5	Participat	ion requirement	ts:							
	Formal:	None	2							
	Content:	None	2							
6	Forms of	assessment:								
	Term pa	per								
7	Prerequis Module	ite for the award	d of credit points: ass							
8	Applicati Apparati	on of the modul	e (in the following ogy B Sc	study pr	ogramn	nes)				
9	Importan	ce of the grade f	for the final grade:							
-	accordin	g to BRPO								
10	Module c	oordinator:								
	Prof. Dr.	-Ing. Anton K	lar							
11	Other info	ormation:								
	Literatur	e will be anno	ounced at the begi	inning c	of the c	ourse.				
12	Language	:								
	German									







Qual	ity Manage	ement							QM	
Identi	ification	Workload:	Credits:	Study	/ semest	er:	Frequency	y of the	Durati	on:
1229		150 h	5	4th seme	or ester	6th	Annual (Summer)	1 sem	ester
1	Course:		Planned group s	sizes	Scop	e	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
	Energian		20 - tra dourte		0	CU	0	1.	0	1
	Exercise Drastical		20 students		0	SCH	0	h	0	n h
	Flactical	n semma	15 students		0	зсп	0	11	0	11
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
3	Contents: History of the QM concept, overview of the current quality management standards, evaluation of the eight principles of QM, development of the essential contents of the ISO 9000 family (especially for the areas of procurement, incoming goods, production and sales), process orientation, project management, measures/programmes for continuous improvement (CIP, Six Sigma, idea management), quality objectives and key figures (balanced scorecard), quality costs, customer satisfaction analyses, benchmarking, customer and supplier relations (supplier audit), legal aspects.									
_	Lecture,	practicals and	d exercises							
5	Participati	on requirement	its:							
	Formal:	INON Non	.e							
6	Forms of	assessment:								
U	Written e	examination	combination exar	mination	. perfo	rmance	examinatio	on or oral e	xaminati	on
7	Prerequisi	te for the awar	rd of credit points:		, perio					
	Module e	examination	pass							
8	Applicatio	on of the modu	le (in the following	g study pr	rogramn	nes)				
	Apparati	ve Biotechno	logy B.Sc., Engir	neering	Compu	ter Scie	nces B.Eng	g. and Mecl	natronics	B.Sc.
9	Importanc	e of the grade	for the final grade:							
10	according Module av	g to BRPO								
10	Prof. Dr.	-Ing. Reinhar	rd Kaschuba							

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

Automatic Control Engineering							RT			
Identi numb	fication er:	Workload:	Credits:	Study	semest	er:	Frequency	of the	Duratio	n:
1234		150 h	5	4th s	emeste	r	Annual (S	ummer)	1 seme	ster
1	Course:		Planned group size	zes	Scop	e	Actual co / classroo teaching	ntact time m	Self-stud	у
	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
	Recognise and describe the elementary relationships, basic concepts and haws of control engineering. Recognise and describe the elementary relationships in the structure of control engineering solutions. Grasp the practical significance of control engineering. Describe and apply the basic means of describing and analysing technical processes. Understand the practical significance of control technology. Enable the development of independent solutions in simple and the system is suitable for a wide range of control engineering applications.									
3	Fundame description frequency synthesiss discontin	entals of cor on, transfer e y behaviour o of analogue uous controlle	ntrol engineering lements, normalis f transfer element e and digital con ers, digital contro	s, comj sation a s, locus ntrol lo llers, fu	ponents and line curves pop ele zzy co	s of co earisatio s, Bode o ements, ntrollers	ontrol engin n, time beh diagram, La simulation s, state contr	neering, a naviour of place tran of contro ollers.	amplifiers transfer sform, and ol loops,	, system elements, alysis and stability,
4	Forms of	teaching:								
	Lecture,	practicals and	exercises							
5	Participati	on requirement	ts:							
	Formal:	None	2							
6	Content:	None	2							
6	Forms of a	assessment:	ombination avan	instion	norfo		avomination	or oral a	vominatio	n
7	Prerequisi	te for the awar	d of credit points:	mation	, perio	mance	examination		xammatio	11
/	Module e	examination n	ass and course as	sessmer	nt					
8	Applicatio	on of the modul	e (in the following	study pr	ogramn	nes)				
0	Apparati	ve Biotechnol	ogy B.Sc. and Me	echatro	nics B.	Sc.				
9	Importanc	e of the grade f	for the final grade:			201				
	according	g to BRPO	0							
10	Module co	oordinator:								
	Prof. Dr.	-Ing. Reinhard	d Kaschuba							
11	Other info	ormation:								
	Literatur	e will be anno	ounced at the begi	nning o	f the c	ourse.				
12	Language	:								
	German									

Robo	otics								ROB	
Identi	fication	Workload:	Credits:	Study	semest	er:	Frequency	of the	Duration	:
1240		150 h	5	5th se	emeste	r	Annual (V	Vinter)	1 semes	ter
1	Course:		Planned group si	izes	Scope	9	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
	- ·		20			agu	0		0	
	Exercise		20 students		0	SCH	0	h 1-	0	h h
	Practical	or seminar	15 students		1	SCH	15	n	22.5	n
	Supervise	d self-study	60 students		0	SCH	0	h	0	h
3	basic descriptive tools and methods for modelling and calculating the forward kinematics of a kinematic chain. Through the presentation and discussion of current robot systems (incl. mobile robot systems and multimodal sensor systems), the students can grasp both the practical significance of robotics and different approaches to robot development. This will encourage them to think and work independently in the field of robotics and related applications.									
5	Teaching	content:								
	- Manip	ulators								
	- Robot	kinematics (in	cl. mathematical	founda	tions)					
	- Forwar	rd and inverse	kinematics							
	- Mobile	e robots	hote							
	- Artific	ial intelligence	and robotics							
	- Behavi	our-based rob	otics							
	- Learni	ng robots								
4	Forms of	teaching:	too shin a with a		mmo ati	aa1 aau				
5	Participati	ion requirements	s:	ACICISES	, practi	cai coul	30			
-	Formal:	None								
	Content:	Mathe	ematics 1 and 2,	Comput	ter Scie	ence, En	gineering N	Aechanics,	Electrical	
	Earra C	Engin	eering 1 and 2, I	Physics						
6	Forms of assessment: Written examination combination examination performance examination or oral examination									
7	Prerequisi	te for the award	of credit points:		, perio	munee			initiation	-
	Module e	examination pa	iss and course as	sessmer	nt					
8	Applicatio	on of the module	(in the following	study pr	ogramn	nes)				
	Apparati B.Eng., N	ve Biotechnolo Mechatronics E	ogy B.Sc., Electr B.Sc. and Industr	ical Eng ial Engi	gineerin neerin	ng B.En g and M	g., Enginee lanagement	ring Comp B.Sc.	outer Scien	ces
9	Importanc	the grade for	or the final grade:							
10	according	g to BRPO								
10	Prof Dr	rer pat Marti	n Hiilse							
	1 IOI. DI.	101. Hat. Wall	11 11 11 30							

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

Technical English								TEN	TEN	
Identification Workload:		Workload:	Credits:	Credits: Study		er:	Frequency of the		Duration:	
1263		150 h	5	4th so	emeste	r	offer Annual (Summer)		1 semester	
1	Course:		Planned group si	Scope		Actual contact time / classroom teaching		Self-study		
	Lecture		60 students		0	SCH	0	h	0	h
	Tuition in 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
	Supervised self-study		60 students		0	SCH	0	h	0	h
	 Expertise: The students acquire an extended active language competence at the upper B2 level. They have a sound specialist vocabulary of Technical English and can combine it with Business English terminology relevant to their profession. Social competence: they develop sensitivity to differences in intercultural communication, especially in English-speaking business environment. Methodological competence: They are able to skim specialist texts for essential information and present them shortly and concisely both in speaking and in writing. They establish wider contexts and make a critical assessment. Personal competence: They show English fluency and a pro-active approach to managing authentic English sources. 									
3	 Contents: Students can actively participate in international conferences. They master engineering-relevant terminology (e.g. manufacturing processes; mathematical operations; dimensions and shapes; forces and mechanisms; properties of materials; automated systems and Industry 4.0). They possess interdisciplinary skills (e.g. discussing readings and trends; pitching a technical product; managing projects; designing conference posters; academic writing). 									
4	Forms of teaching: Seminar-based teaching / individual and group work, etc. / semester project (Assignment)									
5	Participation requirements:									
Formal: Regular attendance (70%) and active participation										
	Content: English language competence: B1.2 (according to the European Re								eference	
6	Forms of assessment:									
0	Combina	tion examinat	ion							
7	Prerequisi	ite for the award	l of credit points:							

	Passed semester project and written exam							
8	Application of the module (in the following study programmes)							
	Apparative Biotechnology B.Sc. and Mechatronics B.Sc.							
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							

Textile Technologies								TEX	TEX	
Identification number:		Workload:	Credits:	Study	Study semester:		Frequency of the offer		Duration:	
6004		150 h	5	4th seme	4th or 6th semester		Annual (Summer)		1 semester	
1	Course: Pl		Planned group si	lanned group sizes		2	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 of	or seminar	15 students		0	SCH	0	h	0	h
	Supervised self-study		60 students	60 students		SCH	0	h	0	h
3	Describing the textile chain, comparing different textile fabrics and materials, indicating the most important textile testing procedures and recent research topics. Students describe, analyse and assess a topic from the textile chain independently. Contents: Textile chain: primary spinning, secondary spinning, weaving, warp and weft knitting, braiding, narrow textiles, finishing, manufacture; textile machines; sustainability in the textile chain; intelligent/functional textiles; physical and other properties of textiles; standards; textile testing instruments. Recent research topics along the textile chain.									
4	Forms of teaching:									
-	Lecture.	hands-on semi	nar							
5	Participati	ion requirements	3:							
	Formal:									
	Content:									
6	Forms of	assessment:								
	Project w	vork								
7	Prerequisi	te for the award	of credit points:							
	Module e	examination pa	ISS							
8	Applicatio	on of the module	(in the following	study pr	ogramm	nes)				
	Apparati	ve Biotechnolo	bgy B.Sc., Mech	atronics	B.Sc.,	Renew	able Energie	es B.Eng.	and Indust	rial
0	Engineering and Management B.Sc.									
7	according to BRPO									
10	Module coordinator:									
	Prof. Dr. Dr. Andrea Ehrmann									
11	Other information:									
12	Language	:								
	English									

Elective Module: Apparative Biotechnology									WM	WM	
Identification		Workload:		Credits:	Study semester:		Frequency of the		Duration:		
number: 9020		150 h		5	4th/5 seme	:h/6th ster		offer each semester		1 semester	
1	Course:		Planned group sizes		ies	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		15 students			0	SCH	0	h	0	h
	Supervised self-study			60 students			SCH		h		h
2	Learning outcomes/competences:										
3	Contents:										
4	Forms of teaching:										
5	Participati	on requirement	ts:								
	Formal:										
	Content:										
6	Forms of a	assessment:									
7	Prerequisite for the award of credit points:										
8	Applicatio	on of the modul	e (in	the following s	study pr	ogramm	les)				
	Apparative Biotechnology B.Sc.										
9	Importance of the grade for the final grade:										
10	Module coordinator:										
	Prof. Dr.	rer. pol. Hild	egar	d Manz-Schur	nacher						
11	Other information:										
12											
12	German	•									
12	German										