



# **Annex SFB**

# Studienfachbeschreibung (subject description, SFB) for the subject Mathematical Physics as a Bachelor's with 1 major with the degree "Bachelor of Science" (180 ECTS credits)

**Responsible:** Institute of Mathematics Examination regulations version: 2012 **Responsible:** Faculty of Physics and Astronomy Examination regulations version: 2012 Abbreviations used: Course types:  $\mathbf{E} = \text{field trip}$ ,  $\mathbf{K} = \text{colloquium}$ ,  $\mathbf{O} = \text{conversatorium}$ ,  $\mathbf{P} = \text{placement/lab course}$ ,  $\mathbf{R} = \text{project}$ ,  $\mathbf{S} = \text{seminar}$ ,  $\mathbf{T} = \text{tutorial}$ ,  $\mathbf{U} = \text{exercise}$ ,  $\mathbf{V}$ = lecture Term: **SS** = summer semester. **WS** = winter semester Methods of grading: **NUM** = numerical grade, **B/NB** = (not) successfully completed Regulations: (L)ASPO = general academic and examination regulations (for teaching-degree programmes), FSB = subject-specific provisions, SFB = list of modules Other: A = thesis, LV = course(s), PL = assessment(s), TN = participants, VL = prerequisite(s) Conventions for the Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not cremodules in this SFB: ditable for bonus. Information on Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the meassessment procedures: thod of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner. Should a module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below. Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

#### In accordance with the general regulations governing the degree subject described in this module catalogue:

### ASP02009

associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

### 25-Oct-2012 (2012-170)

This module handbook seeks to render, as accurately as possible, the data that is of statutory relevance according to the examination regulations of the degree subject. However, only the FSB (subject-specific provisions) and SFB (list of modules) in their officially published versions shall be legally binding. In the case of doubt, the provisions on, in particular, module assessments specified in the FSB/SFB shall prevail.

Every module will be described using the following form:

Abbreviation	Module title										
	ECTS		Duration	(in semesters)	Method of grading		Module level				
	Courses		To be spe	be specified in the form X (y) with course type X abbreviated as specified above and number of weekly contact hours y							
	Method of as	ssessme	ent								
	Only after su completion of		l if applica	if applicable							
	Other prereq	uisites	if applica	if applicable							
	Participants on of places		ocati- if applica	if applicable							
	Additional in	formatio	on if applica	if applicable							
	Referred to in	n LPO I	if applica	if applicable (examination regulations for teaching-degree programmes)							

Aathematics (69	ECTS crea	dits)										
D-M-ANA-122-	Analys	is										
101	ECTS	20	Duratio	n	2 semester	Method of gradin	g numerical grade	Modul level	undergraduate			
	Course	S		<ul> <li>This module comprises 3 module components. Information on courses will be listed separately for each module component.</li> <li>10-M-ANA-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>10-M-ANA-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>10-M-ANA-P-122: M (no information on SWS (weekly contact hours) and course language available)</li> </ul>								
	Method of assessment			Asses stated	sment in this mo I otherwise, succ	dule comprises the as essful completion of t	sessments in the indivi he module will require s	dual module compone successful completion	nts as specified below. Unless of all individual assessments.			
				Asses • • •	8 ECTS, Method written examina by an oral exam approx. 30 minu as subject of the (Prüfungsteilmo Language of ass Other prerequis students about a declaration of assessment ove dents who mee assessment at a <b>sment in module</b> 8 ECTS, Method written examina by an oral exam approx. 30 minu as subject of the (Prüfungsteilmo Language of ass Other prerequis students about a declaration of assessment ove dents who mee assessment at a <b>sment in module</b> 4 ECTS, Method oral examinatio modules 10-M-A	of grading: (not) succ tion (approx. 90 to 186 ination of one candid utes). Module will also e oral examination co- dul)) and this examin sessment: German, Er- ites: Certain prerequis the respective details will to seek admissioner the course of the s- t all prerequisites will a later date, students <b>component 10-M-AN</b> of grading: (not) succ tion (approx. 90 to 186 ination of one candid utes). Module will also e oral examination co- dul)) and this examin sessment: German, Er- ites: Certain prerequisites the respective details will to seek admissioner to seek admissioner to all prerequisites will a later date, students the respective details will to seek admissioner the course of the sec t all prerequisites will a later date, students <b>component 10-M-AN</b> of grading: numerical n of one candidate e NA-1 and 10-M-ANA-2	o minutes); if announced late each (approx. 20 m o be considered success vering several modules ( ation was passed. glish if agreed upon with ites must be met to qual at the beginning of the on to assessment. If stud- emester, the lecturer will be admitted to assessr will have to obtain the q <b>A-2-122:</b> Analysis 2 Anal essfully completed o minutes); if announced late each (approx. 20 m o be considered success vering several modules ( ation was passed. glish if agreed upon with ites must be met to qual at the beginning of the on to assessment. If stud- emester, the lecturer will be admitted to assessr vill have to obtain the q <b>A-P-122:</b> Examination in grade ach (approx. 30 minute	by the lecturer, the wri- inutes) or an oral exa- fully completed if the r (separate module completed) h the examiner ify for admission to asse e course. Registration f dents have obtained the l put their registration ment in the current or ualification for admiss lysis 2 by the lecturer, the wri- inutes) or an oral exa- fully completed if the r (separate module completed) for admission to asse e course. Registration f dents have obtained the ll put their registration ment in the current or ualification for admiss Analysis s); assessment will has	tten examination can be replaced mination in groups (groups of 2, module component was selected ponent for assessment purposes eessment. The lecturer will inform for the course will be considered he qualification for admission to for assessment into effect. Stu- in the subsequent semester. For ion to assessment anew. tten examination can be replaced mination in groups (groups of 2, module component was selected ponent for assessment purposes eessment. The lecturer will inform for the course will be considered he qualification for admission to for assessment into effect. Stu- in the subsequent semester. For ion to assessment anew.			
				•	Language of ass	sessment: German, Er	glish if agreed upon with		<u> </u>			
Bachelor's with 1 majo	r Mathematica	al Physics (	2012)		one of the other	Two module compon	JMU Würzburg • generate	ed 26-Aug-2024 • exam. reg. dat	ta record 82 b55 - - H 2012 page 3 / 3 le component 10-M-ANA-P.			
	other n	rerequi	sites	By way			s are listed in the section					
	other prerequisi Referred to in LP				1) 1. Mathematik	· · ·						

10-M-LNA-122-m01	Linear	Algebra							
	ECTS	20 Duratio	on 2 semester Method of grading numerical grade Modul level undergraduate						
	Course		<ul> <li>his module comprises 3 module components. Information on courses will be listed separately for each module component.</li> <li>10-M-LNA-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>10-M-LNA-2-122: V + Ü (no information on SWS (weekly contact hours) and course language available)</li> <li>10-M-LNA-P-122: M (no information on SWS (weekly contact hours) and course language available)</li> </ul>						
	Methoo	d of assessment	Assessment in this module comprises the assessments in the individual module components as specified below. Unless Stated otherwise, successful completion of the module will require successful completion of all individual assessments.						
			<ul> <li>Assessment in module component 10-M-LNA-1122: Linear Algebra 1 Linear Algebra 1</li> <li>8 ECTS, Method of grading: (not) successfully completed</li> <li>written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination covering several modules (separate module component for assessment purposes (Prifungsteilmodul)) and this examination was passed.</li> <li>Language of assessment: German, English if agreed upon with the examiner</li> <li>Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment tore the course of the sensester, the lecturer will put their registration for assessment into a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment in module component in <i>OM</i>-LNA-2122: Linear Algebra 2 Linear Algebra 2.</li> <li>8 ECTS, Method of grading: (not) successfully completed</li> <li>written examination (approx. 90 to 180 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the module component was selected as subject of the oral examination was passed.</li> <li>8 ECTS, Method of grading: (not) successfully completed if the woulle component was selected as subject of the oral examination orage several modules (separate module component was selected by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes). Module will also be considered successfully completed if the mod</li></ul>						
	othorp	rerequisites	one of the other two module components is a prerequisite for participation in module component 10-M-LNA-P. By way of exception, additional prerequisites are listed in the section on assessments.						
Bachelor's with 1 major M		•	By way of exception, additional prerequisites are instead in the section on assessments.         JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 82 b55 - - H 2012       page 4 / 30						

10-M-MMP-122-	Mathe	matics i	in Mathem	natical	Physics					
01	ECTS	20	Duratior	n	2 semester	Method of grading	numerical grade	Modul level	undergraduate	
	Course	25		•	10-M-MMP-2-122: 10-M-MMP-1-122:	V + Ü (no information / + Ü (no information	Information on courses will on SWS (weekly contact hou on SWS (weekly contact hou SWS (weekly contact hours)	rs) and course lan rs) and course lan	guage available) guage available)	component.
	Methoo	d of ass	essment				essments in the individual m module will require success			
				Asses	8 ECTS, Method of written examinatio by an oral examina approx. 30 minute as subject of the o (Prüfungsteilmodu Language of asses Other prerequisite: students about the a declaration of wi assessment over t dents who meet a assessment at a la <b>sment in module co</b> CS 1 8 ECTS, Method of written examinatio by an oral examina approx. 30 minute as subject of the o (Prüfungsteilmodu Language of asses Other prerequisite: students about the a declaration of wi assessment over t dents who meet a assessment over t dents who meet a assessment at a la <b>sment in module co</b> 4 ECTS, Method of	grading: (not) succes n (approx. 90 to 180 m ation of one candida s). Module will also b ral examination cove (I)) and this examinat sment: German, Engl s: Certain prerequisite e respective details a ill to seek admission he course of the sen Il prerequisites will b ther date, students wi <b>omponent 10-M-MMP</b> grading: (not) succes n (approx. 90 to 180 m ation of one candida s). Module will also b ral examination cove (I)) and this examinat sment: German, Engl s: Certain prerequisite e respective details a ill to seek admission the course of the sen Il prerequisites will b tran the seamination cove sent: German, Engl s: Certain prerequisite e respective details a ill to seek admission the course of the sen Il prerequisites will b ther date, students wi <b>omponent 10-M-MMP</b> grading: numerical g	ninutes); if announced by the e each (approx. 20 minutes) e considered successfully co- ing several modules (separa on was passed. sh if agreed upon with the ex- es must be met to qualify for a t the beginning of the course to assessment. If students h ester, the lecturer will put th e admitted to assessment in l have to obtain the qualifica- <b>1-122:</b> Mathematics in Math sfully completed ninutes); if announced by the e each (approx. 20 minutes) e considered successfully co- ing several modules (separa on was passed. sh if agreed upon with the ex- es must be met to qualify for a t the beginning of the course to assessment. If students h ester, the lecturer will put the eadmitted to assessment in l have to obtain the qualifica- <b>P-122:</b> Examination in Math-	lecturer, the writte ) or an oral exami impleted if the mo- te module compo- xaminer demission to assess e. Registration for have obtained the neir registration for the current or in tion for admission ematical Physics of lecturer, the writte ) or an oral exami impleted if the mo- te module compo- xaminer demission to assess e. Registration for have obtained the neir registration for the current or in tion for admission the current or in tion for admission ematics in Mathem	n examination can be nation in groups (group dule component was nent for assessment the course will be c qualification for adrou- or assessment into e the subsequent sem to assessment ane Mathematics in Ma n examination can be nation in groups (group dule component was nent for assessment the course will be c qualification for adrou- r assessment into e the subsequent sem to assessment into e the subsequent sem to assessment ane to assessment ane to assessment ane to assessment ane to assessment ane to assessment ane to assessment ane natical Physics	e replaced oups of 2, s selected purposes will inform onsidered mission to effect. Stu- nester. For w. thematical e replaced oups of 2, s selected purposes will inform onsidered mission to effect. Stu- nester. For w.
				•	Language of asses Only after success	ful completion of mo	sh if agreed upon with the ex dule components: Successf	ul completion of t	he written examinat	ion in any
chologic with a main wi	Anthomation	al Dhusias (	(2012)		one of the other tw	inouule componen	ts is a prerequisite for partici	•		ý
helor's with 1 major N	1		ormation	•	10-M-MMP-2-122: /	Additional informatio	JMU Würzburg • generated 26-Aug r for each module componen n on module duration: 1 to 2	t.	cora 82 b55 - - H 2012	page 5 / 30
					10-M-MMP-1-122: - 10-M-MMP-P-122: -					

10-M-VAN-122-	Advanc	ed Ana	lysis										
m01	ECTS	9	Duration	า	1 semester		Method of grading	nun	nerical grade		Modul level	undergraduate	
	Course	S		V + Ü	(no information	on S	SWS (weekly contact	hour	rs) and course	language av	ailable)		
	Method	d of ass	essment	if ann 20 mi	written examination (approx. 90 to 180 minutes) if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner								
<b>Physics (61 ECTS c</b> For students intere	other p	orerequi	sites	tive d on to the le sessn	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.								
	sted in p												
							iysics), will be offere er, block course will						
11-KP-092-m01	-						Vaves, Oscillations,					chiester).	
	ECTS	16	Duration		2 semester	-	Method of grading				Modul level	undergraduate	
	Course		1						-	s 1 (Mechan	1	at)): V (4 weekly contact hours) + Ü	
		-		(2 weekly contact hours), once a year (winter semester) Klassische Physik 2 (Elektromagnetismus, Optik) (Classical Physics 2 (Electromagnetism, Optics)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester)									
	Methoo	d of ass	essment	<ul> <li>This module has the following assessment components</li> <li>1. Topics covered in lectures and exercises in part 1 (Klassische Physik 1 (Classical Physics 1)): written examination (approx. 120 minutes).</li> <li>2. Topics covered in lectures and exercises in part 2 (Klassische Physik 2 (Classical Physics 2)): written examination (approx. 120 minutes).</li> </ul>									
				3. Top usu	oics covered in le ally chosen) or v	ectur writt	res and exercises in en examination (app	parts prox.	1 and 2: oral e 120 minutes).	examination	of one candida	ate each (approx. 30 minutes,	
				Succe 2.	essful completion	n of		tice v	work each is a	prerequisite	for admission	to assessment components 1 and	
				To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Klassische Physik 1 (Classical Physics 1) and Klassische Physik 2 (Classical Phy- sics 2). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.									
											pass assessment component 3.		
	other p	rerequi	sites	Bridg	e course Mathen	natis	sche Rechenmethod	en de	er Physik (Matl	nematical Mo	ethods of Phys	ics) for first-semester students.	

Bachelor's with 1 major Mathematical Physics (2012)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 82 b55 - - H 2012	page 6 / 30

11-P-PA-112-m01	Lab Cou	urse A											
	ECTS	5	Duration	า	1 semester		Method of	grading	(not) succe	essfully co	mpleted	Modul level	undergraduate
	Courses	5		conta Beisp	ct hour), once a y	year nik, W	(winter sem	nester)	-				veekly contact hour) + Ü (1 week mics and Electricity, BAM): P (2
	Method of assessmen			This n 1. Top 2. Lab (exa	nodule has the fo nodule has the fo nodule has the fo nodule has the following the fol	ollow ecture aring ) Talk	es and exer , performin	cises: wri g and eva	tten examir luating the	e experime	ents will b	e considered s	successfully completed if a Testa sics-related contents of the cou
				To pas retake Stude Stude Beisp	uccessful completion of approx. 50% of practice work is a prerequisite for admission to assessment component 1. o pass assessment component 2, students must pass both elements a) and b). Students will be offered one opportunity to etake element a) and/or element b). tudents must register for assessment components 1 and 2 online (details to be announced). tudents must attend Auswertung von Messungen und Fehlerrechnung (Measurements and Data Analysis) before attending eispiele aus Mechanik, Wärmelehre und Elektrik (Examples from Mechanics, Thermodynamics and Electricity).								
	Referre	d to in L	-	§ 53 ( § 77 (	1) 1. a) Physik Me 1) 1. c) Physik ph 1) 1. a) Physik "G 1) 1. d) Physik "pl	nysika Grund	alische Grui Ilagen der E	ndpraktik xperimen	а	hre, Optik	, der spez	iellen Relativit	tätstheorie
11-P-MPB-122-m01	Laborat	tory Cou	urse Math	ematical Physics B									
	ECTS	4	Duration	า	1 semester		Method of	grading	(not) succe	essfully co	mpleted	Modul level	undergraduate
	Courses	s		P (no	information on S	SWS (	(weekly con	itact hour	s) and cour	rse langua	age availa	ble)	
	Method	l of asse	essment	am) is 30 mi	passed. Experin nutes) to test the	ments e can	s that were ididate's ur	not succo derstand	essfully con ing of the p	npleted ca physics-re	an be repe lated cont	eated once. An ents of the mo	cessfully completed if a Testat ( nd b) talk (with discussion; appr odule component. Talks that we ve to be successfully completed
					ional information			ration: 1 to	2 semeste	ers.			
11-P-MPC-122-m01		ed Labo				<u> </u>							
	ECTS	4	Duration	1	1 semester		Method of	grading	(not) succe	essfully co	mpleted	Modul level	undergraduate
	Courses	S		P (no	information on S	SWS (	(weekly con	itact hour	s) and cour	rse langua	age availa	ble)	
				am) is 30 mi not su	passed. Experin nutes) to test the accessfully comp	ments e can oletec	s that were ididate's ur d can be rep	not succe nderstand peated on	essfully con ing of the p ce. Both co	npleted ca physics-re omponent	an be repe lated cont	eated once. An ents of the mo	ccessfully completed if a Testat ( nd b) talk (with discussion; appr odule component. Talks that we ve to be successfully completed
	Additio	nal Info	rmation	Additi	ional information	n on r	module dur	ration: 1 to	2 semeste	ers.			

Bachelor's with 1 major Mathematical Physics (2012)	JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 82 b55 - - H 2012	page 7 / 30

11-STE-092-m01	Statist	ical Me	chanics, Tl	hermodynamics and Ele	ectrodynamics						
	ECTS	16	Duration	2 semester	Method of grading numerical grade	Modul level	undergraduate				
	Course	!S		weekly contact hours),	und Thermodynamik (Statistical Mechanics and once a year (winter semester) namik (Theoretical Electrodynamics): V (4 weekl r)						
	Metho	d of ass		<ul> <li>This module has the following assessment components</li> <li>1. Topics covered in lectures and exercises in part 1 (Statistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics)): written examination (approx. 120 minutes).</li> <li>2. Topics covered in lectures and exercises in part 2 (Theoretische Elektrodynamik (Theoretical Electrodynamics)): written examination (approx. 120 minutes).</li> <li>3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).</li> </ul>							
				Successful completion 2. Students are highly rec and Thermodynamics) courses will be covered Students must register To pass this module, so The grade achieved in the	at 3 will be offered in German; English if agreed u of approx. 50% of practice work each is a prerect commended to attend both courses Statistische and Theoretische Elektrodynamik (Theoretical El d in assessment component 3. for assessment components 1 through 3 online tudents must first pass assessment component assessment component 1 or 2 (whichever is bett wards the overall grade awarded for the module	quisite for admission t Mechanik und Thermo lectrodynamics). The t (details to be annound 1 or 2 and must then p er) and the grade achi	o assessment components 1 and odynamik (Statistical Mechanics opics discussed in these two ced). ass assessment component 3.				
	other p	rerequi	isites	10-M1-PHY and 10-M2-	PHY or 10-M1-NST and 10-M2-NST						

11-TQM-092-m01	Theore	tical Me	chanics a	and Quantum Mechanics							
	ECTS	16	Duratio	2 semester	Method of grading	numerical grade	Modul level	undergraduate			
	Course	S	<u>.</u>		Theoretical Mechanic	s): V (4 weekly contact hours	s) + Ü (2 weekly cor	ntact hours), once a year (winter			
				emester) Quantenmechanik (Quantum Mechanics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer se-							
				mester)							
	Method	d of asse	essment	This module has the follo							
				1. Topics covered in lectu (approx. 120 minutes).		oart 1 (Theoretische Mechan	ik (Theoretical Mec	hanics)): written examination			
				2. Topics covered in lectu 120 minutes).	ires and exercises in p	oart 2 (Quantenmechanik (Q	uantum Mechanics	s)): written examination (approx.			
							3. Topics covered in lectu usually chosen) or writ			ion of one candidat	e each (approx. 30 minutes,
							Successful completion of 2.	f approx. 50% of pract	tice work each is a prerequis	site for admission to	o assessment components 1 and
				highly recommended to a tum Mechanics). The top	attend both courses T ics discussed in these		oretical Mechanics) d in assessment co				
				The grade achieved in as	sessment component			ass assessment component 3. eved in assessment component 3			
	other p	rerequis	sites	10-M1-PHY, 10-M2-PHY a	nd 11-MPI-3 or 10-M1-I	NST, 10-M2-NST and MPI-3					

11-TQM-F-092-m01	Theore	etical Me	chanics a	nd Quantum Mechanic	s for FOKUS Students						
	ECTS	16	Duratior	2 semester	Method of grading	numerical grade	Modul level	undergraduate			
	Course	25		semester) Quantenmechanik für	OKUS-Studierende (Qu	antum Mechanics for FOKUS	Students): V (4 v	ontact hours), once a year (winter veekly contact hours) + Ü (2 wee- eak between summer and winter			
	Metho	d of asse	essment	<ol> <li>Topics covered in lea (approx. 120 minute</li> <li>Topics covered in lea KUS Students)): writ</li> <li>Topics covered in lea usually chosen) or w</li> <li>Successful completion</li> <li>To qualify for admission highly recommended t</li> <li>KUS-Studierende (Qua sessment component)</li> </ol>	<ul> <li>This module has the following assessment components</li> <li>1. Topics covered in lectures and exercises in part 1 (Theoretische Mechanik (Theoretical Mechanics)): writte (approx. 120 minutes).</li> <li>2. Topics covered in lectures and exercises in part 2 (Quantenmechanik für FOKUS-Studierende (Quantum N KUS Students)): written examination (approx. 120 minutes).</li> <li>3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx usually chosen) or written examination (approx. 120 minutes).</li> <li>Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment of the second secon</li></ul>						
				To pass this module, s The grade achieved in will each count 50% to	udents must first pass assessment componen wards the overall grade	t 1 or 2 (whichever is better) ar awarded for the module.	and must then nd the grade ach	nced). pass assessment component 3. nieved in assessment component 3			
	Module comple	es succe eted	essfully	10-M-PHY1 and 10-M-P	HY2 or 10-M-NST1 and 1	.o-M-NST2 and 11-TQM-1, 11-KF					
	Additio	onal Info	rmation			ter's degree programme must t tead of Quantenmechanik (Qu		chanik für FOKUS-Studierende cs).			

Compulsory Electi	Compulsory Electives (20 ECTS credits)											
Mathematics	Nathematics											
10-M-COM-122-	Computational Mathematics											
m01	ECTS 4 Duration			n	1 semester	Method of grading	(not) successfully completed	Modul level	undergraduate			
	Course	S		V + Ü	+ Ü (no information on SWS (weekly contact hours) and course language available)							
	Methoo	d of asse	essment	project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course) Language of assessment: German, English if agreed upon with the examiner								
	other p	rerequis	sites	tive d on to the le sessn	etails at the beginni assessment. If stud cturer will put their	ing of the course. Reg ents have obtained th registration for assess or in the subsequent s	istration for the course will be ne qualification for admission t sment into effect. Students wh	considered a de to assessment o o meet all prere	form students about the respec- eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as- ents will have to obtain the quali-			

10-M-ERP-122-mo		<u> </u>		thematics for Mathematical Physics						
	ECTS	10	Duration		Method of grading	-	Modul level	undergraduate		
	Course	S		<ul> <li>10-M-NUM-1-122</li> <li>FAN-1-122: V + L</li> </ul>	2, 10-M-STO-1-122, 10-1 I (no information on lan	on courses listed separately M-ALG-1-122, 10-M-DGE-1-1 guage and number of week anguage and number of week	122, 10-M-GAN-1-12 kly contact hours av	2, 10-M-DIM-1-122, and 10-M- ailable)		
	Method	d of ass				components. To pass this n below and the assessment		ist pass one out of the 7 as- last in the list below.		
				<ul> <li>ponent 10-M-STO-1-12 duction to Algebra), in al Geometry), in modu</li> <li>M-DIM-1-122: Einführung</li> <li>8 ECTS credits,</li> <li>written examina ced by an oral e dates (approx.) as subject of th (Prüfungsteilmon Language of asse</li> <li>Additional prere- turer will inform be considered a admission to asse effect. Students ster. For assess</li> <li>Assessment in module sessment in Selected</li> <li>2 ECTS credits,</li> <li>oral examinatio in the module c</li> <li>Language of asse</li> <li>Only after succe</li> </ul>	2: Stochastik 1 (Stochast module component 10- le component 10-M-GAN ing in die Diskrete Math in die Funktionalanalys pass / fail tion (approx. 90 to 180 examination of one cance to minutes). The module oral examination cove dul)) and this examinat sessment: German; Engle equisites: To qualify for students about the res a declaration of will to s sessment over the cour who meet all prerequis ment at a later date, stu component 10-M-ERP- Topics from Mathematic numerical grading n of one candidate each omponent selected by s sessment: German; Engle essful completion of mo	stics 1), in module component M-DGE-1-122: Einführung in M-14:22: Geometrische Analematik (Introduction to Dis is (Introduction to Function minutes). If announced by lidate each (approx. 20 minuse component will also be of ring several modules (sepa- tion is passed. lish if agreed upon with exa- admission to assessment, pective details at the begine eek admission to assessment, pective details at the begine eek admission to assessment, se of the semester, the lect ites will be admitted to asses dents will have to obtain th P-122: Prüfung in Ergänzun is for Mathematical Physics n (approx. 30 minutes). Assestudents. lish if agreed upon with exa-	ent 10-M-ALG-1-122 n die Differentialgeo lysis (Geometric Ana screte Mathematics) nal Analysis) : the lecturer, the wrinutes) or an oral exa considered success arate module compo aminer(s) students must mee nning of the course. ent. If students have turer will put their me sessment in the curr ne qualification for a ng Mathematik für M s) sessment will have aminer(s) e component 10-M-E	reference to the topics covered RP-P can only be taken by stu-		
	other p	rereaui	sites			are listed in the section on	,			
				,,						

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10-M-EWP-122-	Further Topics from Mathematics for Mathematical Physics											
m01	ECTS	20	Duratio	n 2 semester	Method of grading	numerical grade	Modul level	undergraduate				
	Course			<ul> <li>This module has 8 components; information on courses listed separately for each component.</li> <li>10-M-NUM-1-122, 10-M-STO-1-122, 10-M-ALG-1-122, 10-M-DGE-1-122, 10-M-GAN-1-122, 10-M-DIM-1-122, and 10-M-FAN-1-122: V + Ü (no information on language and number of weekly contact hours available)</li> <li>10-M-EWP-P-122: M (no information on language and number of weekly contact hours available)</li> <li>This module has the following 8 assessment components. To pass this module, students must select tow out of the 7 as-</li> </ul>								
	Metho	a or assi	essment	sessment components ponent that is last in t Assessment in module ponent 10-M-STO-1-12	s that are first in the list he list below. e component 10-M-NUM 22: Stochastik 1 (Stochastik 1)	below and pass one of -1-122: Numerische Ma stics 1), in module com	them, furthermore they athematik 1 (Numerical <i>N</i> <b>ponent 10-M-ALG-1-122</b>	Mathematics 1), <b>in module com</b> - Einführung in die Algebra (Intro- metrie (Introduction to Differenti-				
				al Geometry), <b>in modu</b> M-DIM-1-122: Einführung • 8 ECTS credits, • written examina ced by an oral e	le component 10-M-GAN Ing in die Diskrete Math in die Funktionalanalys pass / fail ation (approx. 90 to 180 examination of one canc	<b>V-1-122:</b> Geometrische <i>A</i> ematik (Introduction to is (Introduction to Func minutes). If announced lidate each (approx. 20	Analysis (Geometric Ana Discrete Mathematics) ctional Analysis) : by the lecturer, the write minutes) or an oral exa	alysis), <b>in module component 10</b> - and <b>in module component 10-M</b> - tten examination may be repla- mination in groups of 2 candi- fully completed if it is selected				
				<ul> <li>as subject of th (Prüfungsteilmo</li> <li>Language of as</li> <li>Additional prevention of the considered a admission to as effect. Students</li> </ul>	e oral examination cove odul)) and this examinat sessment: German; Eng equisites: To qualify for a students about the res a declaration of will to s ssessment over the cours who meet all prerequis	ring several modules (st ion is passed. lish if agreed upon with admission to assessme pective details at the b eek admission to asses rse of the semester, the ites will be admitted to	separate module compo n examiner(s) ent, students must meet leginning of the course. ssment. If students have e lecturer will put their re assessment in the curre	t certain prerequisites. The lec- Registration for the course will obtained the qualification for egistration for assessment into ent or in the subsequent seme- dmission to assessment anew.				
				Assessment in module sessment in Further To • 4 ECTS credits, • oral examination in the two modu • Language of as • Only after succe	e component 10-M-EWP opics from Mathematics numerical grading on of one candidate each ule components selecter sessment: German; Eng	<b>-P-122:</b> Prüfung in Erwe for Mathematical Physi h (approx. 30 minutes). d by students. lish if agreed upon with dule components: Moc	iterung Mathematik für ics) . Assessment will have i n examiner(s) dule component 10-M-E <sup>1</sup>	Mathematische Physik (As- reference to the topics covered WP-P can only be taken by stu-				
	other p	prerequi	sites	By way of exception, a	dditional prerequisites	are listed in the section	n on assessments.					
	Additio	onal Infc	ormation	Additional informatior	n on module duration: 1	to 2 semesters.						

10-M-MWR-122-	Modell	Modelling and Computational Science										
m01	ECTS	10	Duratio	1	1 semester	Method of grading	numerical grade	Modul level	undergraduate			
	Course	S		V + Ü (no information on SWS (weekly contact hours) and course language available)								
	Methoo	l of ass	essment	if ann 20 mi	written examination (approx. 90 to 180 minutes) if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English if agreed upon with the examiner							
	other prerequisites			tive d on to the le sessn	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.							
10-M-SEM-122-	Semina	r Math	ematics									
m01	ECTS	5	Duratio	ı	1 semester	Method of grading	(not) successfully co	mpleted Modul level	undergraduate			
	Course	S		S (no	information on SW	S (weekly contact hou	rs) and course langua	ige available)				
	Method of assessment				approx. 60 to 180 n lage of assessment	ninutes) t: German, English if a	greed upon with the e	examiner				
	other prerequisites			Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.								
Physics												
11-A4-072-m01	Astrop	hysics										
	ECTS	6	Duratio	า	1 semester	Method of grading	numerical grade	Modul level	undergraduate			
	Course	S		V + S (no information on SWS (weekly contact hours) and course language available)								
	Method	d of ass	essment	written examination (approx. 120 minutes)								
	other prerequisites			Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.								
	Particip cation	oants ar of place		Only a	as part of pool of ge	eneral key skills (ASQ)	: 15 places. Places wi	ll be allocated by lot.				

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11-AKM-092-m01	Cosmology										
-	ECTS	6	Duratio	n	1 semester	Method of grading	numerical grade	Modul level	graduate		
	Course	S		R + V	(no information of	on SWS (weekly contact	hours) and course lang	guage available)			
	Methoo	d of ass	essment	prox. to 10 Asses nound 2009	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English						
	other prerequisites			tive d on to the le sessn	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.						
11-APL-092-m01	Plasma	a-Astrop	physics								
-	ECTS 6 Duratio			n	1 semester	Method of grading	numerical grade	Modul level	graduate		
	Course	S		R + V (no information on SWS (weekly contact hours) and course language available)							
	Method of assessment			a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English							
	other prerequisites		Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.								
11-AST-092-m01	Theore	tical As	trophysic	S							
	ECTS	6	Duratio	n	1 semester	Method of grading	numerical grade	Modul level	graduate		
	Course	-			-		t hours) and course lang	guage available)			
	Method	d of ass	essment	writte	n examination (a	pprox. 120 minutes)					

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11-EPP-092-m01	Introdu	Introduction to Plasmaphysics									
	ECTS	6	Duratio	ı	1 semester	Method of grading numerical grade	Modul	level	graduate		
	Course	S		V + R	(no information o	n SWS (weekly contact hours) and course l	language available)				
	Methoo	1 of asse	essment	prox. to 10 Asses nound 2009.	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English						
	other p	prerequis	sites	tive d on to the le sessn	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.						
11-FKP-092-m01	Solid State Physics 1										
	ECTS	8	Duratio	า	1 semester	Method of grading numerical grade	Modul	level	undergraduate		
	Courses			V + Ü (no information on SWS (weekly contact hours) and course language available)							
	Method of assessment										
	other p	prerequis	sites	tive d on to the le sessn	etails at the begin assessment. If stu cturer will put the nent in the current	nust be met to qualify for admission to asso nning of the course. Registration for the cou udents have obtained the qualification for eir registration for assessment into effect. S t or in the subsequent semester. For asses to assessment anew.	urse will be consider admission to asses Students who meet a	red a de sment e Ill prere	eclaration of will to seek admissi- over the course of the semester, equisites will be admitted to as-		

11-GRT-092-m01	Group	Theory							
	ECTS	6	Duratior	า	1 semester	Method of gradins	g numerical grade	Modul level	graduate
	Course	s		R + V	(no information on	SWS (weekly contac	t hours) and course language av	/ailable)	
	Methoo	l of ass	essment	prox. to 10   Asses nounc 2009.	30 minutes per can pages, time to com sment offered: Wh ced in due form un	ndidate, for modules pplete: 1 to 4 weeks) nen and how often as	with less than 4 ECTS credits ap or d) presentation/seminar pres	prox. 20 minute entation (approx ds on the metho	d of assessment and will be an-
	other p	rerequi		tive do on to the le sessm	etails at the begin assessment. If stu cturer will put thei nent in the current	ning of the course. Re dents have obtained r registration for asse	egistration for the course will be the qualification for admission t essment into effect. Students wh	considered a de to assessment o no meet all prere	
11-KET-122-m01	Nuclear and Elementary Particle Physics								
	ECTS	6	Duratior	ı	1 semester	Method of gradins	g numerical grade	Modul level	undergraduate
	Course	s		V + Ü (no information on SWS (weekly contact hours) and course language available)					
	Method	d of ass	essment	written examination (approx. 120 minutes)					
	other p	rerequi	sites	tive do on to the le sessm	etails at the begin assessment. If stu cturer will put thei nent in the current	ning of the course. Re dents have obtained r registration for asse	egistration for the course will be the qualification for admission t essment into effect. Students wh	considered a de to assessment o no meet all prere	

11-KM-092-m01	Condensed Matter (Qua	anta, Atoms, Molecules, Solid State Physics)							
	ECTS 16 Duratio	n 2 semester Method of grading numerical grade Modul level undergraduate							
	Courses	Kondensierte Materie 1 (Quanten, Atome, Moleküle) (Condensed Matter 1 (Quanta, Atoms, Molecules)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester) Kondensierte Materie 2 (Festkörperphysik 1) (Condensed Matter 2 (Solid State Physics)): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer semester)							
	Method of assessment	<ul> <li>This module has the following assessment components</li> <li>1. Topics covered in lectures and exercises in part 1 (Kondensierte Materie 1 (Condensed Matter 1)): written examination (approx. 120 minutes).</li> <li>2. Topics covered in lectures and exercises in part 2 (Kondensierte Materie 2 (Condensed Matter 2)): written examination (approx. 120 minutes).</li> <li>3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes).</li> <li>Assessment component 3 will be offered in German; English if agreed upon with examiner(s).</li> <li>Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2.</li> <li>To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Kondensierte Materie 1 (Condensed Matter 1) and Kondensierte Materie 2 (Condensed Matter 2). The topics discussed in these two courses will be covered in assessment component 3.</li> <li>Students must register for assessment components 1 through 3 online (details to be announced).</li> <li>To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3.</li> </ul>							
11-NMA-111-m01	will each count 50% towards the overall grade awarded for the module.         Computational Astrophysics								
	ECTS 6 Duratio								
	Courses	V + R (no information on SWS (weekly contact hours) and course language available)							
		a) written examination (approx. 120 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English							
	other prerequisites	Language of assessment: German, English Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.							

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11-PKS-092-m01	Physic	Physics of Complex Systems										
	ECTS	6	Duratio	ı	1 semester	Method of grading	numerical grade	Modul level	graduate			
	Course	S		R + V	(no information or	SWS (weekly contact	hours) and course language a	available)				
	Metho	d of ass	essment	prox. to 10 Asses nounc 2009.	30 minutes per ca pages, time to cor sment offered: Wi ced in due form ur	ndidate, for modules w nplete: 1 to 4 weeks) o nen and how often ass	with less than 4 ECTS credits a r d) presentation/seminar pre	approx. 20 minute sentation (approx nds on the metho	d of assessment and will be an-			
	other p	rerequi	sites	tive d on to the le sessm	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.							
11-QAM-092-m01	Quanta, Atoms, Molecules											
	ECTS	8	Duratio	า	1 semester	Method of grading	numerical grade	Modul level	undergraduate			
	Courses			Ü + Ü (no information on SWS (weekly contact hours) and course language available)								
	Method of assessment			written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; unless otherwise specified) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.								
	other p	rerequi	sites	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.								

11-QFT2-092-m01	Quantum Field	Theory II									
	ECTS 6	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate				
	Courses	R + V	(no information on	SWS (weekly contact	hours) and course language av	ailable)					
	Method of asse	prox. to 10 Asses noun 2009	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English								
	other prerequis	tive d on to the le sessr	etails at the beginn assessment. If stud cturer will put their	ing of the course. Reg ents have obtained t registration for asses or in the subsequent	gistration for the course will be he qualification for admission t ssment into effect. Students wh	considered a de to assessment c o meet all prere	form students about the respec- eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as- ents will have to obtain the quali-				
11-QIC-092-m01	Quantum Information and Quantum Computing										
	ECTS 5	Duration	1 semester	Method of grading	numerical grade	Modul level	graduate				
	Courses	R + V	(no information on	SWS (weekly contact	hours) and course language av	ailable)					
	Method of asse	prox. to 10 Asses noun 2009	30 minutes per can pages, time to comp ssment offered: Whe ced in due form und	didate, for modules v olete: 1 to 4 weeks) o en and how often ass ler observance of Sec	with less than 4 ECTS credits ap r d) presentation/seminar prese	prox. 20 minute entation (approx ls on the metho	d of assessment and will be an-				
	other prerequis	tive d on to the le sessr	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.								

11-QM2-092-m01	Quantu	m Mecha	anics II									
	ECTS	8	Duration		1 semester	Method of grading	numerical grade	Modul level	undergraduate			
	Courses	-		R + V (	no information on	SWS (weekly contact	hours) and course language a	vailable)				
	Method	of asses	F t 7 2	prox. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English								
	other pr	rerequisi	t c t	ive de on to a he lec sessm	etails at the begin assessment. If stu cturer will put thei ent in the current	ning of the course. Reg dents have obtained t r registration for asses	gistration for the course will be he qualification for admission sement into effect. Students w	e considered a de to assessment c ho meet all prere	form students about the respec- eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as- ents will have to obtain the quali-			
11-QVTP-092-m01	Many B	ody Qua										
	ECTS 8 Duratio				1 semester	Method of grading	numerical grade	Modul level	graduate			
	Courses	5	F	R + V (	no information on	SWS (weekly contact	hours) and course language a	vailable)				
	Method	of asses	r t 2	orox. 3 0 10 p Assess 10unc 2009.	go minutes per can bages, time to com sment offered: Wh ed in due form un	ndidate, for modules v iplete: 1 to 4 weeks) o en and how often ass	vith less than 4 ECTS credits a r d) presentation/seminar pre	pprox. 20 minute sentation (appro ids on the metho	d of assessment and will be an-			
	other pr	rerequisi	t c t s	ive de on to a he lec sessm	etails at the begin assessment. If stu cturer will put their rent in the current	ning of the course. Reg dents have obtained t r registration for asses	gistration for the course will be he qualification for admission ssment into effect. Students w	e considered a de to assessment c ho meet all prere	form students about the respec- eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as- ents will have to obtain the quali-			

11-RMFT-102-m01	Renorn	nalizati	on Group N	Netho	ds in Field Theory			-			
	ECTS	6	Duration		1 semester	Method of grading	numerical grade	Modul level	graduate		
	Course	s		V + R (no information on SWS (weekly contact hours) and course language available)							
	Methoo	l of ass		a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English							
		rerequi		Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.							
11-RMS-092-m01	Relativistic Effects in Mesoscopic Systems										
	ECTS	5	Duration		1 semester	Method of grading	numerical grade	Modul level	graduate		
	Course	S		R + V (	no information on	SWS (weekly contact	hours) and course language av	ailable)			
	Methoo	l of ass		prox. to 10   Asses nounc 2009.	30 minutes per can pages, time to com sment offered: Wh ced in due form unc	didate, for modules v plete: 1 to 4 weeks) of en and how often assi der observance of Sec	with less than 4 ECTS credits ap r d) presentation/seminar prese	prox. 20 minute entation (appro: Is on the metho	d of assessment and will be an-		
	other p	orerequi		Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.							

11-RNT-092-m01	Renorm	nalizatio	on Theory								
	ECTS	6	Duration		1 semester	Method of grading	numerical grade	Modul level	graduate		
	Course	S		R + V (	no information on	SWS (weekly contact	hours) and course language av	ailable)			
	Methoo	1 of asso		a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English							
	other p	prerequi		tive de on to a the lee sessm	etails at the beginr assessment. If stud cturer will put their tent in the current	ning of the course. Reg dents have obtained t r registration for asses	gistration for the course will be he qualification for admission t sment into effect. Students wh	considered a de to assessment o o meet all prere	form students about the respec- eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as- ents will have to obtain the quali-		
11-RQFT-092-m01	Relativistical Quantumfield Theory										
	ECTS 8 Duratio				1 semester	Method of grading	numerical grade	Modul level	graduate		
	Courses			R + V (no information on SWS (weekly contact hours) and course language available)							
	Methoo	1 of ass		prox. 3 to 10 p Asses nounc 2009.	30 minutes per car bages, time to com sment offered: Wh ced in due form und	ndidate, for modules w plete: 1 to 4 weeks) of en and how often assider observance of Sec	vith less than 4 ECTS credits ap r d) presentation/seminar prese	prox. 20 minute entation (appro» Is on the metho	d of assessment and will be an-		
	other p	prerequi		tive de on to a the lee sessm	etails at the beginr assessment. If stud cturer will put their tent in the current	ning of the course. Reg dents have obtained t r registration for asses	gistration for the course will be he qualification for admission t ssment into effect. Students wh	considered a de to assessment o o meet all prere	form students about the respec- eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as- ents will have to obtain the quali-		

11-RTT-092-m01	Theory of Relativity											
	ECTS	6	Duration	1	1 semester	Method of grading numerical grade	Modul level	graduate				
	Course	s		R + V (no information on SWS (weekly contact hours) and course language available)								
	Methoo	l of asso		prox. : to 10 p Asses nounc 2009.	30 minutes per can pages, time to com ssment offered: Wh ced in due form un	approx. 90 minutes) or b) oral examination of one ndidate, for modules with less than 4 ECTS credits nplete: 1 to 4 weeks) or d) presentation/seminar pr nen and how often assessment will be offered depe der observance of Section 32 Subsection 3 ASPO ( nt: German, English	approx. 20 minute resentation (appro ends on the metho	es) or c) project report (approx. 8 x. 30 minutes) d of assessment and will be an-				
		prerequi		tive de on to a the lee sessm ficatio	etails at the begin assessment. If stu cturer will put thei nent in the current on for admission to	ust be met to qualify for admission to assessment. ning of the course. Registration for the course will I dents have obtained the qualification for admissic r registration for assessment into effect. Students or in the subsequent semester. For assessment at assessment anew.	be considered a de on to assessment c who meet all prere	eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as-				
11-SDC-092-m01	Statist	ics, Dat	a Analysis	and C	Computer Physics							
	ECTS 4 Duratio			1	1 semester	Method of grading numerical grade	Modul level	graduate				
	Course	S		R + V (	(no information on	SWS (weekly contact hours) and course language	available)					
	Methoo	1 of ass		prox. ( to 10 p Asses nound 2009.	30 minutes per can pages, time to com ssment offered: Wh ced in due form un	approx. 90 minutes) or b) oral examination of one ndidate, for modules with less than 4 ECTS credits nplete: 1 to 4 weeks) or d) presentation/seminar pr nen and how often assessment will be offered depe der observance of Section 32 Subsection 3 ASPO ( nt: German, English	approx. 20 minute resentation (appro ends on the metho	es) or c) project report (approx. 8 x. 30 minutes) d of assessment and will be an-				
	other p	prerequi		Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.								

11-SUS-092-m01	Supers	ymmetr	y I and II								
	ECTS	6	Duration		1 semester	Method of grading	numerical grade	Modul level	graduate		
	Course						hours) and course language av	-			
	Methoo	1 of asse		prox. : to 10 p Asses nounc 2009.	30 minutes per car pages, time to com sment offered: Wh ced in due form und	ndidate, for modules v pplete: 1 to 4 weeks) of en and how often assi der observance of Sec	vith less than 4 ECTS credits ap r d) presentation/seminar prese	prox. 20 minute entation (approx Is on the metho	d of assessment and will be an-		
11-TEP-092-m01		prerequis		tive de on to a the lee sessm ficatio	etails at the beginr assessment. If stuc cturer will put their pent in the current on for admission to	ning of the course. Reg dents have obtained t r registration for asses	gistration for the course will be he qualification for admission t sment into effect. Students wh	considered a de to assessment o o meet all prere	form students about the respec- eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as- ents will have to obtain the quali-		
	Theoretical Elementary Particle Physics										
	ECTS 8 Duratio				1 semester	Method of grading	numerical grade	Modul level	graduate		
	Course	S		R + V (	no information on	SWS (weekly contact	hours) and course language av	ailable)			
	Methoo	1 of asse		prox. ( to 10 p Asses nound 2009.	30 minutes per car pages, time to com sment offered: Wh ced in due form und	ndidate, for modules v pplete: 1 to 4 weeks) of en and how often assi der observance of Sec	vith less than 4 ECTS credits ap r d) presentation/seminar prese	prox. 20 minute entation (approx Is on the metho	d of assessment and will be an-		
	other p	prerequis		Language of assessment: German, English Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.							

11-TFK-092-m01	Theoretical Solid State Physics												
	ECTS	8	Duration	1	1 semester	Method of grading	numerical grade	Modul level	graduate				
	Courses	5		R + V	(no information on	SWS (weekly contact I	hours) and course language av	vailable)					
	Method	of asse		a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English									
	other pr	rerequis		tive d on to the le sessn	etails at the begin assessment. If stu cturer will put thei nent in the current	ning of the course. Reg dents have obtained th r registration for assess	istration for the course will be ne qualification for admission sment into effect. Students wh	considered a de to assessment c no meet all prere	form students about the respec- eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as- ents will have to obtain the quali-				
11-TPS-092-m01	Particle Physics (Standard Model)												
	ECTS 8 Duratio			ı	1 semester	Method of grading	numerical grade	Modul level	graduate				
	Courses	5		R + V	(no information on	SWS (weekly contact l	hours) and course language av	vailable)					
	Method	of asse		prox. to 10 Asses nound 2009.	30 minutes per can pages, time to com ssment offered: Wh ced in due form un	ndidate, for modules w pplete: 1 to 4 weeks) or en and how often asse	vith less than 4 ECTS credits ap d) presentation/seminar pres	oprox. 20 minute sentation (appro ds on the metho	d of assessment and will be an-				
	other pr	rerequis		tive d on to the le sessn	etails at the begin assessment. If stu cturer will put thei nent in the current	ning of the course. Reg dents have obtained th r registration for assess	istration for the course will be ne qualification for admission sment into effect. Students wh	considered a de to assessment c no meet all prere	form students about the respec- eclaration of will to seek admissi- over the course of the semester, quisites will be admitted to as- ents will have to obtain the quali-				

11-TSL-092-m01	Theory	of Sup	erconduct	ion					_		
	ECTS	5	Duration	า	1 semester	Method of gradir	ıg numerical g	grade	Modul level	graduate	
	Course	S		R + V	(no information or	n SWS (weekly conta	ct hours) and c	course language av	ailable)		
	Methoo	d of ass	essment	prox. to 10 Asses nounc 2009.	30 minutes per ca pages, time to cor ssment offered: Wl ced in due form ur	indidate, for module mplete: 1 to 4 weeks hen and how often a	s with less thar ) or d) presenta ssessment will	n 4 ECTS credits ap ition/seminar prese be offered depend	prox. 20 minute entation (appro ls on the metho	r oral examination in groups (ap- es) or c) project report (approx. 8 ix. 30 minutes) od of assessment and will be an- and examination regulations)	
	other p	orerequi	sites	tive d on to the le sessm	etails at the begin assessment. If stu cturer will put the nent in the current	ning of the course. F udents have obtained ir registration for ass	Registration for d the qualificat sessment into e nt semester. For	the course will be ion for admission t effect. Students who	considered a de to assessment o o meet all prere	nform students about the respec- eclaration of will to seek admissi- over the course of the semester, equisites will be admitted to as- ents will have to obtain the quali-	
11-BXMP5-122-m01	Curren	t Topics	of Mathe	matica	al Physics						
	ECTS	5	Duration	า	1 semester	Method of gradir	ıg numerical g	grade	Modul level	undergraduate	
	Courses			V + R	(no information or	n SWS (weekly conta	ct hours) and c	ourse language av	ailable)	-	
	Method of assessment			written examination (approx. 120 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or presentation/seminar presentation (approx. 30 minutes) Language of assessment: German or English							
11-BXMP6-122-	Curren	t Topics	of Mathe	ematical Physics							
m01	ECTS	6	Duration	า	1 semester	Method of gradir	ıg numerical g	grade	Modul level	undergraduate	
	Course	:S	-	V + R	(no information or	n SWS (weekly conta	ct hours) and c	course language av	ailable)	-	
	Method of assessment			written examination (approx. 120 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or presentation/seminar presentation (approx. 30 minutes) Language of assessment: German or English							
11-BXMP8-122-	Curren	t Topics	of Mathe	ematical Physics							
m01	ECTS	8	Duration	า	1 semester	Method of gradir	ıg numerical g	grade	Modul level	undergraduate	
	Course	:S	_	V + R	(no information or	n SWS (weekly conta	ct hours) and c	course language av	ailable)		
	Method	d of ass	essment	written examination (approx. 120 minutes) or oral examination of one candidate each or oral examination in groups (appro 30 minutes per candidate) or project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or presentation/semina presentation (approx. 30 minutes) Language of assessment: German or English							

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Thesis (10 ECTS cre	-										
10-M-BAP-092-		Nathen	natical Ph	ysics (	Bachelor Thesis)						
m01	ECTS	10	Duratio		1 semester	Method of grading	•	Modul level	undergraduate		
	Courses			(no information on SWS (weekly contact hours) and course language available)							
	Method	ofasse	essment								
				Language of assessment: German, English if agreed upon with the examiner							
	other pr	erequis	sites	Registration for assessment: as specified.							
Subject-specific Ke 10-M-MDA and 11-S		be tak	en.								
10-M-MDA-122-	Introduc	ction in	to mathe	matica	l thinking and wor	rking					
m01	ECTS	4	Duratio	า	1 semester	Method of grading	(not) successfully co	mpleted Modul level	undergraduate		
	Courses		-					ses will be listed separa act hours) and course la	ately for each module component.		
								act hours) and course la			
	Method of assessment			and M • • • • • • • • • • • • • • •	lethods of Matherr 2 ECTS, Method o project assignme Language of asse Other prerequisite students about th a declaration of v assessment over dents who meet a assessment at a l <b>sment in module o</b> s 2 ECTS, Method o project assignme Language of asse Other prerequisite students about th a declaration of v assessment over	natical Reasoning f grading: (not) success nts (type and expendit ssment: German, Engl es: Certain prerequisite he respective details a vill to seek admission the course of the sem all prerequisites will b ater date, students wi component 10-M-MDA f grading: (not) success nts (type and expendit ssment: German, Engl es: Certain prerequisite he respective details a vill to seek admission the course of the sem	esfully completed ure of time to be spe- ish if agreed upon wi- es must be met to qua- t the beginning of th to assessment. If stu- nester, the lecturer w e admitted to assess Il have to obtain the o- <b>-2-122:</b> Reasoning an esfully completed ure of time to be spe- ish if agreed upon wi- es must be met to qua- t the beginning of th to assessment. If stu- nester, the lecturer w	cified by the lecturer at th the examiner lify for admission to ass e course. Registration f idents have obtained th ill put their registration ment in the current or qualification for admiss d Writing in Mathematic cified by the lecturer at th the examiner lify for admission to ass e course. Registration f idents have obtained th ill put their registration	matical Reasoning Basic Notions the beginning of the course) sessment. The lecturer will inform for the course will be considered he qualification for admission to for assessment into effect. Stu- in the subsequent semester. For ion to assessment anew. cs Reasoning and Writing in Mathe the beginning of the course) sessment. The lecturer will inform for the course will be considered he qualification for admission to for assessment into effect. Stu- in the subsequent semester. For		
	other pr	erequis	sites	By wa					ion to assessment anew.		
	Referred		_	By way of exception, additional prerequisites are listed in the section on assessments. § 73 (1) 5. Mathematik Angewandte Mathematik							

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10-M-PRG-122-mo	1 Progra	mming	course fo	r stud	ents of Mathemati	cs and other subjects	5			
	ECTS	3	Duratio	า	1 semester	Method of grading	g (not) successfully complete	d Modul level	undergraduate	
	Course	S		P (no	information on SV	VS (weekly contact ho	ours) and course language ava	ilable)		
	Metho	d of ass	essment	the c	ourse)		s (type and expenditure of time agreed upon with the examin		by the lecturer at the beginning of	
11-SMP-092-m01	other p	orerequi	sites	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.						
	Semina	ar Math	ematical	Physic	:S					
	ECTS	4	Duratio	ı	1 semester	Method of grading	g numerical grade	Modul level	undergraduate	
	Courses			S (no	information on SV	VS (weekly contact ho	ours) and course language ava	ilable)	•	
			cosment	talk with discussion (approx. 60 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be an- nounced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English if agreed upon with the examiner						
	other prerequisites			Admi	ssion prerequisite	to assessment: regu	lar attendance and successful	preparation of se	minar presentation.	
11-A1-092-m01	Computational Physics									
	ECTS	6	Duratio	า	1 semester	Method of grading	g numerical grade	Modul level	undergraduate	
	Course	S		V + Ü (no information on SWS (weekly contact hours) and course language available)						
	Method of assessment			written examination (approx. 120 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be an- nounced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.						
	other p	orerequi	sites	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- tive details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- on to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- sessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- fication for admission to assessment anew.						
		oants ar of place		Only	as part of pool of §	general key skills (AS)	Q): 15 places. Places will be all	located by lot.		

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11-P-MR-092-m01	Mathematical Methods of Physics									
	ECTS 6 Duratio		1	2 semester	Method of grading	(not) successfully completed	Modul level	undergraduate		
	Courses			Mathematische Rechenmethoden 1 (Mathematical Methods 1): V (2 weekly contact hours) + Ü (1 weekly contact hour), once a year (winter semester) Mathematische Rechenmethoden 2 (Mathematical Methods 2): V (2 weekly contact hours) + Ü (1 weekly contact hour), once a year (summer semester)						
	Methoo	d of asse	essment	<ul> <li>This module has the following assessment components</li> <li>1. Topics covered in lectures and exercises in part 1 (Mathematische Rechenmethoden 1 (Mathematical Methods 1)): exercises or talk (approx. 15 minutes, usually chosen) or written examination (approx. 60 minutes)</li> <li>2. Topics covered in lectures and exercises in part 2 (Mathematische Rechenmethoden 2 (Mathematical Methods 2)): exercises or talk (approx. 15 minutes, usually chosen) or written examination (approx. 60 minutes)</li> </ul>						
				Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2. Students must register for assessment components 1 and 2 online (details to be announced). To pass this module, students must pass both assessment component 1 and assessment component 2.						
	Referre	d to in L	PO I		1) 1. a) Physik Mecha 1) 1. a) Physik "Grund		lektrizitätslehre, Optik, der spe entalphysik"	eziellen Relativitä	itstheorie	