

# **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

Responsible: Faculty of Physics and Astronomy

Examination regulations version: 2009

Examination regulations version: 2009

Abbreviations used: Course types:  $\mathbf{E} = \text{field trip}$ ,  $\mathbf{K} = \text{colloquium}$ ,  $\mathbf{O} = \text{conversatorium}$ ,  $\mathbf{P} = \text{placement/lab course}$ ,  $\mathbf{R} = \text{project}$ ,  $\mathbf{S} = \text{seminar}$ ,  $\mathbf{T} = \text{tutorial}$ ,  $\mathbf{U} = \text{exercise}$ ,  $\mathbf{V} = \mathbf{V} = \mathbf$ 

= 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 modules in this SFB: ditable for bonus.

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not cre-

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:

#### ASPO2009

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

### 20-Jan-2011 (2011-12)

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	ECTS Durat		(in semesters)	Method of grading		Module level			
	Courses		To be sp	o 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	sessm	ent							
	Only after su completion o		ıl if applic	if applicable						
	Other prereq	uisites	if applic	if applicable						
	Participants and allocation of places		ocati- if applic	if applicable						
	Additional information		ion if applic	if applicable						
	Referred to in	า LPO I	if applic	able (examination re	gulations for teachin	g-degree programmes)				

Compulsory Cours	ses (118 ECTS credits)							
Mathematics (59 l	ECTS credits)							
10-M-PPM-082-	Propaedeutics of Mathe	ematics						
mo1	ECTS 2 Duratio	n 1 semester Method of grading (not) successfully completed Modul level undergraduate						
	Courses	V + Ü (no information on SWS (weekly contact hours) and course language available)						
	Method of assessment	project assignments (type and expenditure of time to be specified by the lecturer at the beginning of the course) Assessment offered: once a year, winter semester Language of assessment: German, English if agreed upon with the examiner						
	other prerequisites	Admission prerequisite to assessment: regular attendance of courses (as specified at the beginning of the course).						
10-M-ANA-082-	Analysis							
mo1	ECTS 17 Duratio							
	Courses	This module comprises 3 module components. Information on courses will be listed separately for each module component.  • 10-M-ANA-1-082: V + Ü (no information on SWS (weekly contact hours) and course language available)  • 10-M-ANA-2-082: W (no information on SWS (weekly contact hours) and course language available)  • 10-M-ANA-P-082: M (no information on SWS (weekly contact hours) and course language available)						
	Method 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.  Assessment in module component 10-M-ANA-1-082: Analysis 1 Analysis 1  8 ECTS, Method of grading: (not) successfully completed  a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)  Language of assessment: German, English if agreed upon with the examiner  Other prerequisites: Modules 10-M-VKM and 10-M-PPM are recommended.  Assessment in module component 10-M-ANA-2-082: Analysis 2 Analysis 2  7 ECTS, Method of grading: (not) successfully completed  a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)  Language of assessment: German, English if agreed upon with the examiner  Other prerequisites: Modules 10-M-VKM and 10-M-PPM are recommended; in addition, module component 10-M-ANA-1 is recommended for module component 10-M-ANA-2.  Assessment in module component 10-M-ANA-P-082: Examination in Analysis  2 ECTS, Method of grading: numerical grade  oral examination of one candidate each (approx. 30 minutes)  Language of assessment: German, English if agreed upon with the examiner  Only after successful completion of module components: Successful completion of any one of the module components 10-M-ANA-1, 10-M-ANA-1, 10-M-ANA-2, 10-M-ANA-2 is a prerequisite for participation in module component 10-M-ANA-P.						
	other prerequisites	By way of exception, additional prerequisites are listed in the section on assessments.						
	Referred to in LPO I	§ 73 (1) 1. Mathematik Analysis						

10-M-LNA-082-	Linear Algebra												
mo1	ECTS 14	Duration	n 2 semester	Method of grading	numerical grade	Modul level	undergraduate						
	Courses		<ul> <li>10-M-LNA-1-082</li> <li>10-M-LNA-2-082</li> </ul>	: V + Ü (no information :: V + Ü (no information	s. Information on courses on SWS (weekly contact h on SWS (weekly contact h SWS (weekly contact hou	ours) and course lang nours) and course lar	nguage available)						
	Method of as	sessment					ts as specified below. Unless f all individual assessments.						
			<ul> <li>7 ECTS, Method</li> <li>written examina oral examination 30 minutes)</li> <li>Language of ass</li> <li>Other prerequist students about a declaration of assessment over dents who mee assessment at a sessment in module</li> <li>5 ECTS, Method</li> <li>written examination 30 minutes)</li> </ul>	of grading: (not) succetion (approx. 90 minutes of one candidate each of one candidate each of one candidate each of sessment: German, Engites: Certain prerequisite the respective details of will to seek admission of the course of the sert all prerequisites will be a later date, students we component 10-M-LNA-of grading: (not) succetion (approx. 90 minutes of one candidate each	es); if announced by the lead to he (approx. 20 minutes) or all shift agreed upon with the ses must be met to qualify the to a to assessment. If studer mester, the lecturer will proper admitted to assessment ill have to obtain the qual examples as Linear Algebra 2 Lessfully completed es); if announced by the lead he (approx. 20 minutes) or	cturer, the written exa an oral examination ne examiner for admission to asse wrse. Registration fo its have obtained the ut their registration fo in the current or ir ification for admission inear Algebra 2	amination can be replaced by an in groups (groups of 2, approx.  essment. The lecturer will inform or the course will be considered e qualification for admission to for assessment into effect. Stunt the subsequent semester. For on to assessment anew.  amination can be replaced by an in groups (groups of 2, approx.						
			Other prerequis students about a declaration of assessment over dents who mee assessment at a Assessment in module     2 ECTS, Method     oral examinatio     Language of asses     Only after success	ites: Certain prerequisit the respective details the respective details will to seek admission or the course of the sert all prerequisites will be a later date, students we component 10-M-LNA-of grading: numerical and of one candidate each sessment: German, Engessful completion of more	at the beginning of the conton to assessment. If studer mester, the lecturer will pose admitted to assessment ill have to obtain the qual P-082: Examination in Lingrade (approx. 30 minutes) lish if agreed upon with the conton of the conton	for admission to asse- ourse. Registration fo outs have obtained the out their registration fo nt in the current or in ification for admission near Algebra	module component 10-M-LNA-1						
	other prerequ	uisites	By way of exception, additional prerequisites are listed in the section on assessments.										
	Referred to in	LPO I	§ 73 (1) 2. Mathematik	Lineare Algebra, Algeb	ra und Elemente der Zahle	entheorie							

10-M-DFT-082-m01	Ordinary Differential Eq	uations and Complex Analysis									
	ECTS 13 Duratio	n 2 semester Method of grading numerical grade Modul level undergraduate									
	Courses	This module comprises 3 module components. Information on courses will be listed separately for each module component.  • 10-M-DFT-1-082: V + Ü (no information on SWS (weekly contact hours) and course language available)  • 10-M-DFT-2-082: W (no information on SWS (weekly contact hours) and course language available)  • 10-M-DFT-P-082: M (no information on SWS (weekly contact hours) and course language available)									
	Method of assessment	<ul> <li>10-M-DFT-P-082: M (no information on SWS (weekly contact hours) and course language available)</li> <li>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.</li> <li>Assessment in module component 10-M-DFT-1-082: Ordinary Differential Equations Ordinary Differential Equations</li> <li>4 ECTS, Method of grading: (not) successfully completed</li> <li>written examination (approx. 90 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)</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. 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.</li> <li>Assessment in module component 10-M-DFT-2-082: Introduction to Complex Analysis Introduction to Complex Analysis</li> <li>7 ECTS, Method of grading: (not) successfully completed</li> <li>written examination (approx. 90 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 minu</li></ul>									
		assessment at a later date, students will have to obtain the qualification for admission to assessment anew.  Assessment in module component 10-M-DFT-P-082: Examination in Ordinary Differential Equations and Complex Analysis  2 ECTS, Method of grading: numerical grade  oral examination of one candidate each (approx. 30 minutes)  Language of assessment: German, English if agreed upon with the examiner  Only after successful completion of module components: Successful completion of module component 10-M-DFT-1 or module component 10-M-DFT-2 is a prerequisite for participation in module component 10-M-DFT-P.									
! —	other prerequisites	By way of exception, additional prerequisites are listed in the section on assessments.									
	Referred to in LPO I	§ 73 (1) 1. Mathematik Analysis									

10-M-GAP-092-	Geome	tric Ana	lysis and	Partia	Partial Differential Equations						
mo1	ECTS	13	Duration	)	2 semester	Method of grading	numerical grade	Modul level	undergraduate		
	Courses			•	This module comprises 3 module components. Information on courses will be listed separately for each module component.  • 10-M-GAP-1-092: V + Ü (no information on SWS (weekly contact hours) and course language available)  • 10-M-GAP-2-092: V + Ü (no information on SWS (weekly contact hours) and course language available)  • 10-M-GAP-P-092: M (no information on SWS (weekly contact hours) and course language available)						
	Method	d of asse		stated	d otherwise, succes	sful completion of the	essments in the individual mod e module will require successful <b>1-092:</b> Geometric Analysis Geor	completion of	all individual assessments.		
				<ul> <li>7 ECTS, Method of grading: (not) successfully completed</li> <li>a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)</li> <li>Language of assessment: German, English if agreed upon with the examiner</li> <li>Other prerequisites: Modules 10-M-ANA and 10-M-LNA are recommended.</li> </ul>							
				•	4 ECTS, Method of a) written examina 20 minutes) or c) of Language of assess	f grading: (not) succes ation (approx. 90 min oral examination in gr ssment: German, Engl	<b>2-092:</b> Partial Differential Equates sfully completed utes; usually chosen) or b) oral roups (groups of 2, approx. 30 m lish if agreed upon with the exart and 10-M-LNA are recommended.	examination on ninutes) miner			
				Assessment in module component 10-M-GAP-P-092: Examination in Geometric Analysis and Partial Differential Equations  • 2 ECTS, Method of grading: numerical grade  • oral examination of one candidate each (approx. 30 minutes)  • Language of assessment: German, English if agreed upon with the examiner  • Only after successful completion of module components: 10-M-GAP-1 or 10-M-GAP-2  • Other prerequisites: Modules 10-M-ANA and 10-M-LNA are recommended.							
	other prerequisites			By wa	y of exception, add	itional prerequisites a	are listed in the section on asse	ssments.			

# Physics (59 ECTS credits)

For students interested in participating in the FOKUS programme, module 11-TQM-F will replace module 11-TQM. Module component 11-TQM-F-2, which will prepare students for studying in the Master's programme FOKUS Physik (FOKUS Physics), will be offered in the form of a block course between the lecture periods of the winter and summer semesters (for students who took up studies in winter semester, block course will be offered between third and fourth subject semester).

summer semesters	(for stud						l be offered between third and	fourth subject se	emester).		
11-KP-092-m01	Classic	al Physi	ics (Mech	anics, T	hermodynamics, W	Vaves, Oscillations	, Electricity, Magnetism and O	ptics)			
	ECTS	16	Duration	1 2	2 semester	Method of grading	numerical grade	Modul level	undergraduate		
	Courses			Klassische Physik 1 (Mechanik, Wellen, Wärme) (Classical Physics 1 (Mechanics, Waves, Heat)): 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)							
	Method of assessment			<ol> <li>Topic</li> <li>120 n</li> <li>Topic</li> </ol>	cs covered in lectur minutes).	res and exercises in	part 1 (Klassische Physik 1 (C	•	)): written examination (approx.		
				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).							
									erman; English if agreed upor ctice work each is a prerequis		to assessment components 1 and
				highly r sics 2). Student To pass The grad	recommended to at The topics discuss ts must register for this module, stud de achieved in ass	ttend both courses sed in these two con assessment compents must first passessment componer	Klassische Physik 1 (Classical urses will be covered in assessionents 1 through 3 online (dets assessment component 1 or 1 or 2 (whichever is better) a	Physics 1) and Klasment component ails to be announ and must then p			
	other prerequisites					<u>-</u>	e awarded for the module. den der Physik (Mathematical	Methods of Physi	cs) for first-semester students.		

11-STE-092-m01	Statisti	cal Med	chanics, T	hermodynamics and E	Electrodynamics						
	ECTS	16	Duration	2 semester	Method of grading numerical grade	Modul level	undergraduate				
	Courses	5		weekly contact hours Theoretische Elektroc	tatistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics): V (4 weekly contact hours) + Ü (2 reekly contact hours), once a year (winter semester) heoretische Elektrodynamik (Theoretical Electrodynamics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a rear (summer semester)						
	Method	l of ass	essment	<ol> <li>Topics covered in least Thermodynamics)</li> <li>Topics covered in least amination (approx.</li> <li>Topics covered in least topics covered in least topics.</li> </ol>	e following assessment components lectures and exercises in part 1 (Statistische Mecl): written examination (approx. 120 minutes). lectures and exercises in part 2 (Theoretische Ele x. 120 minutes). lectures and exercises in parts 1 and 2: oral exam r written examination (approx. 120 minutes).	ektrodynamik (Theoretic	al Electrodynamics)): written ex-				
				Successful completion 2. Students are highly reand Thermodynamics courses will be covered Students must registed To pass this module, The grade achieved in	nent 3 will be offered in German; English if agreed on of approx. 50% of practice work each is a prerecess, and Theoretische Elektrodynamik (Theoretical ared in assessment component 3. ter for assessment components 1 through 3 onlines, students must first pass assessment component in assessment component 1 or 2 (whichever is best towards the overall grade awarded for the modul	equisite for admission to e Mechanik und Thermo Electrodynamics). The to e (details to be annound to 1 or 2 and must then petter) and the grade achi	o assessment components 1 and odynamik (Statistical Mechanics opics discussed in these two ced).				
	other pi	rerequi	sites	10-M1-PHY and 10-M2	12-PHY or 10-M1-NST and 10-M2-NST						

11-TQM-092-m01	Theore	tical Me	chanics a	ınd Quantum Mechani	cs				
	ECTS	16	Duratio	2 semester	Method of grading	numerical grade	Modul level	undergraduate	
	Course	S	•	Theoretische Mechan	ik (Theoretical Mechanic	cs): V (4 weekly contact hours	) + Ü (2 weekly cor	ntact hours), once a year (winter	
				semester)					
				Quantenmechanik (Q mester)	uantum Mechanics): V (A	4 weekly contact hours) + U (2	2 weekly contact h	ours), once a year (summer se-	
	Method	d of asse	essment		ollowing assessment co				
				1. Topics covered in le (approx. 120 minut		part 1 (Theoretische Mechani	k (Theoretical Med	chanics)): written examination	
				2. Topics covered in le 120 minutes).	ectures and exercises in	part 2 (Quantenmechanik (Qu	uantum Mechanics	s)): written examination (approx.	
				3. Topics covered in lousually chosen) or	e each (approx. 30 minutes,				
					Successful completio 2.	n of approx. 50% of prac	tice work each is a prerequis	ite for admission t	o assessment components 1 and
				To qualify for admissi highly recommended tum Mechanics). The Students must registe	to attend both courses I topics discussed in thes or for assessment compo	Theoretische Mechanik (Theoret e two courses will be covered onents 1 through 3 online (det	retical Mechanics) I in assessment co ails to be annound	ced).	
				The grade achieved in	assessment componen			ass assessment component 3. eved in assessment component 3	
	other p	rerequi	sites	10-M1-PHY, 10-M2-PH	Y and 11-MPI-3 or 10-M1-	NST, 10-M2-NST and MPI-3			

11-TQM-F-092-m01	Theore	Theoretical Mechanics and Quantum Mechanics for FOKUS Students											
	ECTS	16	Duration	2 semester	Method of grading   numerical grade	Modul level	undergraduate						
	Courses			semester) Quantenmechanik für F	k (Theoretical Mechanics): V (4 weekly contact FOKUS-Studierende (Quantum Mechanics for 1 weekly contact hour), once a year (block tau	FOKUS Students): V (4 w	eekly contact hours) + Ü (2 wee-						
	Metho	d of ass		<ol> <li>Topics covered in lec (approx. 120 minutes</li> <li>Topics covered in lec KUS Students)): writt</li> <li>Topics covered in lec</li> </ol>	ollowing assessment components ctures and exercises in part 1 (Theoretische Ms).  Ctures and exercises in part 2 (Quantenmechaten examination (approx. 120 minutes).  Ctures and exercises in parts 1 and 2: oral examination (approx. 120 minutes).	anik für FOKUS-Studieren	de (Quantum Mechanics for FO-						
				2. To qualify for admission highly recommended to KUS-Studierende (Quassessment component of Students must register To pass this module, storage achieved in a	of approx. 50% of practice work each is a present to assessment component 3, students must o attend both courses Theoretische Mechanik ntum Mechanics for FOKUS Students). The top 3.  If for assessment components 1 through 3 online tudents must first pass assessment component assessment component 1 or 2 (whichever is bounded to the model).	t pass assessment comp (Theoretical Mechanics pics discussed in these t ne (details to be announ ent 1 or 2 and must then poetter) and the grade ach	oonent 1 and/or 2. Students are ) and Quantenmechanik für FO- wo courses will be covered in as- ced). cass assessment component 3.						
	Modules successfully completed			10-M-PHY1 and 10-M-Ph	HY2 or 10-M-NST1 and 10-M-NST2 and 11-TQM	l-1, 11-KP							
	Additio	onal Info	ormation		o study the FOKUS Master's degree programm for FOKUS Students) instead of Quantenmech								

11-P-PB-MP-092-	Practical Course Part B Mathematical Physics											
mo1	ECTS 6 Duration	n 1 semester Method of grading (not) successfully completed Modul level undergraduate										
	Courses	Klassische Physik (Classical Physics, KLP): P (2 weekly contact hours)  Elektrizitätslehre und Schaltungen (Electricity and Circuits, ELS): P (2 weekly contact hours)  Wellenoptik (Physical Optics, WOP): P (2 weekly contact hours)  Atom- und Kernphysik (Atomic and Nuclear Physics, AKP): P (2 weekly contact hours)  Computer und Messtechnik (Computers and Measurement Technology, CMT): P (2 weekly contact hours)										
	Method of assessment	<ul> <li>This module has the following assessment components</li> <li>1. Lab course in part 1: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).</li> <li>2. Lab course in part 2: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes).</li> <li>Students must register for assessment components 1 and 2 online (registration deadline to be announced).</li> <li>Students will be offered one opportunity to retake element a) and/or element b). To pass an assessment component, they must pass both elements a) and b).</li> <li>To pass this module, students must successfully complete two out of the five courses.</li> <li>Students must take exactly one course each in the areas KLP and ELS as well as one course in the areas WOP, AKP and CMT.</li> <li>Students must attend KLP or ELS courses prior to attending WOP, AKP or CMT courses.</li> </ul>										
		To pass this module, students must pass both assessment component 1 and assessment component 2.										
	Modules successfully completed	11-P-PA										
	Referred to in LPO I	§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie § 53 (1) 1. b) Physik Aufbau der Materie § 53 (1) 1. c) Physik physikalische Grundpraktika § 77 (1) 1. b) Physik "Fortgeschrittene Experimentalphysik" § 77 (1) 1. d) Physik "physikalische Praktika"										

11-P-PA-092-m01	Practio	cal Cours	se A								
	ECTS	5	Duration	n [	1 semester	Method of grading	(not) successfully completed	Modul level	undergraduate		
	Courses			contac Beispi	Auswertung von Messungen und Fehlerrechnung (Measurements and Data Analysis): V (1 weekly contact hour) + Ü (1 weekly contact hour), once a year (winter semester) Beispiele aus Mechanik, Wärmelehre und Elektrik (Examples from Mechanics, Thermodynamics and Electricity, BAM): P (2 weekly contact hours)						
	Metho	d of asso	essment	1. Top 2. Lab (exa (app Succe To pas retake Stude Stude Beispi	ics covered in lectur course: a) Preparing am) is passed. b) Tal prox. 30 minutes). ssful completion of as assessment completed to a element a) and/or ants must register for ints must attend Aus fiele aus Mechanik, V	g, performing and evelk (with discussion) to approx. 50% of practionent 2, students melement b). The assessment composwertung von Messur Wärmelehre und Elek	ritten examination (approx. 120 aluating the experiments will be to test the students' understand tice work is a prerequisite for a fust pass both elements a) and nents 1 and 2 online (details to	ding of the physical ding of the physical dings of the physical dings of the physical dings of the dings of t	ill be offered one opportunity to ). Data Analysis) before attending nics and Electricity).		
	Referre	ed to in L	PO I	§ 53 (1		alische Grundprakti	ektrizitätslehre, Optik, der spez ka	ziellen Relativita	ätstheorie		

#### **Compulsory Electives (32 ECTS credits)**

Students must achieve a minimum of 8 ECTS credits in each of the module areas Mathematik (Mathematics) and Physik (Physics). To achieve the remaining 16 ECTS credits, students are to complete additional modules in these two areas (any modules in the respective areas may be selected).

#### **Mathematics** 10-M-BSA-072-**Seminar in Analysis** mo1 ECTS 5 Method of grading | numerical grade Modul level Duration 1 semester undergraduate S (no information on SWS (weekly contact hours) and course language available) Courses Method of assessment | talk (approx. 60 minutes) Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner § 73 (1) 1. Mathematik Analysis Referred to in LPO I 10-M-BSL-072-m01 Seminar in Linear Algebra ECTS 5 Duration 1 semester Method of grading | numerical grade Modul level undergraduate S (no information on SWS (weekly contact hours) and course language available) Courses talk (approx. 60 minutes) Method of assessment Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner Referred to in LPO I § 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie

10-M-BSE-072-	Semina	r in Alg	gebra									
mo1	ECTS	5	Duratio	า	1 semester	Method of grading numerical grade	Modul level	undergraduate				
	Courses	5		S (no	G (no information on SWS (weekly contact hours) and course language available)							
	Method	Method of assessment			alk (approx. 60 minutes) Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner							
	Referre	d to in I	LPO I		73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie							
10-M-BSG-072-	Semina	r in Ge	ometry									
mo1	ECTS	5	Duration	<u> </u>	1 semester	Method of grading numerical grade	Modul level	undergraduate				
	Courses	5		S (no	information on SWS	(weekly contact hours) and course language a	available)					
	Method	l of ass	essment	Asses		ne semester in which the course is offered German, English if agreed upon with the exam	niner					
	Referre	d to in I	LPO I	§ 73 (	1) 4. Mathematik Ge	ometrie						
10-M-BSZ-072-	Semina	r in Nu	mber The	ory								
mo1	ECTS 5 Duration			1	1 semester	Method of grading numerical grade	Modul level	undergraduate				
	Courses	5		S (no	information on SWS	$\mathbf{S}$ (weekly contact hours) and course language $\mathbf{a}$	available)					
	Method of assessment			Asses	talk (approx. 60 minutes) Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner							
	Referred to in LPO I			§ 73 (	1) 2. Mathematik Lin	neare Algebra, Algebra und Elemente der Zahle	entheorie					
10-M-BSW-072-	Semina	Seminar in Ordinary Differential Equations										
mo1	ECTS	5	Duration	า	1 semester	Method of grading numerical grade	Modul level	undergraduate				
	Courses	5		S (no	S (no information on SWS (weekly contact hours) and course language available)							
	Method of assessment			talk (approx. 60 minutes) Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner								
	Referre	d to in I	LPO I	§ 73 (	1) 1. Mathematik An	alysis						
10-M-BSC-072-	Semina	r in Co	mplex Ana	alysis								
mo1	ECTS	5	Duratio	1	1 semester	Method of grading   numerical grade	Modul level	undergraduate				
	Courses	5		S (no	information on SWS	G (weekly contact hours) and course language a	available)					
				Asses	talk (approx. 60 minutes) Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner							
	Referre	d to in I	LPO I	§ 73 (	1) 1. Mathematik An	alysis						

10-M-BSN-072-	Semina	ar in Nun	nerical M	athem	atics							
mo1	ECTS	5	Duration	ı	1 semester	Method of grading   numerical grade	Modul level	undergraduate				
	Course	S		S (no	information on SWS	(weekly contact hours) and course language avail	able)					
	Method	d of asse	essment	Asses		ne semester in which the course is offered German, English if agreed upon with the examiner						
	Referred to in LPO I		§ 73 (	73 (1) 5. Mathematik Angewandte Mathematik								
10-M-BSS-072-	Semina	ar in Sto	chastics									
mo1	ECTS 5 Duratio			ı	1 semester	Method of grading numerical grade	Modul level	undergraduate				
	Course	S		S (no	S (no information on SWS (weekly contact hours) and course language available)							
	Method of assessment			talk (approx. 60 minutes) Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner								
	Referre	d to in L	PO I	§ 73 (	1) 3. Mathematik Sto	ochastik	,					
10-M-BSF-072-m01	Semina	ar in Fun	ctional A	nalysis	5							
	ECTS 5 Duration			ı	1 semester	Method of grading numerical grade	Modul level	undergraduate				
	Course	S		S (no information on SWS (weekly contact hours) and course language available)								
	Method of assessment		talk (approx. 60 minutes)									
10-M-BSO-072-	Semina	ar in Ope	eration Re	esearcl	n							
m01	ECTS	5	Duration	1	1 semester	Method of grading numerical grade	Modul level	undergraduate				
	Course	S		S (no information on SWS (weekly contact hours) and course language available)								
	Method of assessment			talk (approx. 60 minutes)								
10-M-BSD-072-	Semina	ar in Disc	crete Mat	hemat	ics							
mo1	ECTS 5 Duratio		ı	1 semester	Method of grading numerical grade	Modul level	undergraduate					
	Course	S		S (no information on SWS (weekly contact hours) and course language available)								
	Method	d of asse	essment	talk (approx. 60 minutes)								

10-M-EDM-072-	Introduction	to Discrete	Mathematics								
mo1	ECTS 5	Duratio	n 1 semester	Method of grading	numerical grade	Modul level	undergraduate				
	Courses	<del></del> ;	V + Ü (no information	on SWS (weekly contac	t hours) and course lan	iguage available)					
	Method of as	ssessment	vritten examination (approx. 90 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) anguage of assessment: German, English if agreed upon with the examiner								
	other prereq	uisites	tive details at the beg on to assessment. If s the lecturer will put th sessment in the curre	ertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- ve details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- n to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, ne lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- essment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- cation for admission to assessment anew.							
	Referred to i	n LPO I	§ 73 (1) 2. Mathemati	k Lineare Algebra, Algeb	ora und Elemente der Za	ahlentheorie					
10-M-FAN-072-m01	Introduction	to Function	nal Analysis								
	ECTS 5	Duratio	n 1 semester	Method of grading	numerical grade	Modul level	undergraduate				
	Courses		V + Ü (no information	on SWS (weekly contac	t hours) and course lan	iguage available)					
	Method of as	ssessment	examination of one ca	written examination (approx. 90 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) anguage of assessment: German, English if agreed upon with the examiner							
	other prereq	uisites	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.								
	Referred to i	n LPO I	§ 73 (1) 1. Mathematik Analysis								
10-M-ORS-072-	Operations I	Research									
mo1	ECTS 5	Duratio		_	numerical grade	Modul level	undergraduate				
	Courses			on SWS (weekly contac							
			written examination (approx. 90 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 prereq		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.								
	Referred to i	n LPO I	§ 73 (1) 5. Mathematik Angewandte Mathematik								

10-M-NLD-072-	Non-Lir	near Dyn	amics										
mo1	ECTS	5	Duration	1	1 semester	Method of grading	numerical grade		Modul level	undergraduate			
	Course	5		V + Ü	(no information on S	SWS (weekly contact	hours) and course la	anguage ava	ailable)				
	Method	l of asse	ssment	written examination (approx. 90 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 p	rerequis		tive do on to the le- sessm	etails at the beginnir assessment. If stude cturer will put their r	ng of the course. Reg ents have obtained tl egistration for asses in the subsequent s	istration for the cou ne qualification for a sment into effect. St	rse will be c admission to audents who	onsidered a de assessment o meet all prere	form students about the respec- claration of will to seek admissi- ver the course of the semester, quisites will be admitted to as- nts will have to obtain the quali-			
	Referre	d to in L	PO I	§ 73 (1) 1. Mathematik Analysis									

oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approactions)  • Language of assessment: English, German if agreed upon with the examiner  • Other prerequisites: Admission prerequisite to assessment: successful completion of approx. 50% of exercises. On tain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about to respective details at the beginning of the course. Registration for the course will be considered a declaration of the semester, the lecturer will put their registration for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later day students will have to obtain the qualification for admission to assessment anew.  **Assessment component to module component 10 module com	10-M-GEO-082-	Introduction to Geometry											
10-M-GEO-1-082: V + Ü (no information on language and number of weekly contact hours available)  10-M-GEO-2-082: V + Ü (no information on language and number of weekly contact hours available)  11 This module has the following 2 assessment components. To pass the module as a whole students must pass one of the assessment components.  12 Assessment component to module component 10-M-GEO-1-082: Einführung in die Projektive Geometrie 13 ECTS credits, method of grading: numerical grade 14 written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, appr 30 minutes) 15 Language of assessment: English, German if agreed upon with the examiner 16 Other prerequisites: Mainssion prerequisite to assessment: successful completion of approx. 50% of exercises. Of the 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 vore to seek admission to assessment over to seek admission to assessment over to use of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later da students will have to obtain the qualification for admission to assessment anew.  14 Assessment component to module component to-M-GEO-2-082: Einführung in die Differentialgeometrie 15 ECTS credits, method of grading: numerical grade 16 written examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, appr 30 minutes) 16 Language of assessment: English, German if agreed upon with the examiner 17 Other prerequisites: Admission prerequisite to assessment. The lecturer will inform students about the respective details at the beginning o	mo1	ECTS	8	Duration	n 1 semester	Method of grading numerical grade	Modul level	undergraduate					
Assessment component to module component 10-M-GEO-1-082: Einführung in die Projektive Geometrie  8 ECTS credits, method of grading: numerical grade  written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, appr 30 minutes)  Language of assessment: English, German if agreed upon with the examiner  Other prerequisites: Admission prerequisite to assessment: successful completion of approx. 50% of exercises. C tain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about respective details at the beginning of the course. Registration for the course will be considered a declaration of v to seek admission to assessment. If students have obtained the qualification for admission to assessment over t course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all pre quisites will have to obtain the qualification for admission to assessment at a later da students will have to obtain the qualification for admission to assessment as a later da students will have to obtain the qualification for admission to assessment anew.  Assessment component to module component to-Mr-GEO-2-082: Einführung in die Differentialgeometrie  8 ECTS credits, method of grading: numerical grade  written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, appr 30 minutes)  Language of assessment: English, German if agreed upon with the examiner  Other prerequisites: Admission prerequisite 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 v to seek admission to assessment. If students have obtained the qual		Course	es		• 10-M-GEO-1-082: V + Ü (no information on language and number of weekly contact hours available)								
8 ECTS credits, method of grading: numerical grade  written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, appr 30 minutes)  Language of assessment: English, German if agreed upon with the examiner  Other prerequisites: Admission prerequisite to assessment: successful completion of approx. 50% of exercises. C tain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about t respective details at the beginning of the course. Registration for the course will be considered a declaration of to seek admission to assessment. If students have obtained the qualification for admission to assessment over t course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all pre quisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later da students will have to obtain the qualification for admission to assessment anew.  Assessment component to module component 10-M-GEO-2-082: Einführung in die Differentialgeometrie  8 ECTS credits, method of grading: numerical grade  written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, appr 30 minutes)  Language of assessment: English, German if agreed upon with the examiner  Other prerequisites: Admission prerequisite to assessment: successful completion of approx. 50% of exercises. C tain prerequisites: Admission to qualify for admission to assessment. The lecturer will inform students about respective details at the beginning of the course. Registration for the course will be considered a declaration of v to seek admission to assessment in the current or in the subsequent semester. For assessment at a later da s		Metho	d of asse	essment									
aturdanta will be us to abtain the qualification for administration to accompany out an arms					<ul> <li>8 ECTS credits, method of grading: numerical grade</li> <li>written examination (approx. 90 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)</li> <li>Language of assessment: English, German if agreed upon with the examiner</li> <li>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.</li> <li>Assessment component to module component 10-M-GEO-2-082: Einführung in die Differentialgeometrie</li> <li>8 ECTS credits, method of grading: numerical grade</li> <li>written examination (approx. 90 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)</li> <li>Language of assessment: English, German if agreed upon with the examiner</li> <li>Other prerequisites: Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites: Admission prerequisite to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered</li></ul>								
students will have to obtain the qualification for admission to assessment anew.  other prerequisites By way of exception, additional prerequisites are listed in the section on assessments.		other r	orereguis	sites	By way of exception, additional prerequisites are listed in the section on assessments.								
Referred to in LPO I § 73 (1) 4. Mathematik Geometrie													

10-M-ZAL-082-m01	Number Theor	y and Algo	Algebra									
	ECTS 13	Duration	1	2 semester	Method of grading	numerical grade	Modul level	undergraduate				
	Courses		•	10-M-ZAL-1-082: V 10-M-ZAL-2-082: V	/ + Ü (no information / + Ü (no informatior	ts. Information on cours on SWS (weekly contac on SWS (weekly conta SWS (weekly contact h	ct hours) and course la ct hours) and course la	nguage available)				
	Method of ass	essment		sessment in this module comprises the assessments in the individual module components as specified below. Unless ated otherwise, successful completion of the module will require successful completion of all individual assessments.								
			Asses	4 ECTS, Method of written examination or all examination of 30 minutes) Language of assess Other prerequisite students about the adeclaration of wassessment over dents who meet a assessment at a lassment in module of ECTS, Method of written examination or all examination of all examination of the prerequisite students about the	f grading: (not) success (approx. 90 minuted of one candidate earns (see the seed of the seek admission the course of the seek admission (approxement 10-M-ZAL of grading: (not) success (approxement 90 minuted of one candidate earns (seek admission the candidate earns	AL-1-082: Introduction to Number Theory Introduction to Number Theory accessfully completed nutes); if announced by the lecturer, the written examination can be replaced by an each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx English if agreed upon with the examiner uisites must be met to qualify for admission to assessment. The lecturer will inform its at the beginning of the course. Registration for the course will be considered sion to assessment. If students have obtained the qualification for admission to semester, the lecturer will put their registration for assessment into effect. Stuvill be admitted to assessment in the current or in the subsequent semester. For so will have to obtain the qualification for admission to assessment anew.  CAL-2-082: Introduction to Algebra Introduction to Algebra accessfully completed nutes); if announced by the lecturer, the written examination can be replaced by an each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx English if agreed upon with the examiner uisites must be met to qualify for admission to assessment. The lecturer will inform						
			_	a declaration of w assessment over dents who meet a assessment at a la	vill to seek admissio the course of the se all prerequisites will ater date, students v	n to assessment. If stu mester, the lecturer wi be admitted to assessi vill have to obtain the q	dents have obtained the ll put their registration ment in the current or ualification for admiss	ne qualification for admission to for assessment into effect. Stu- in the subsequent semester. For ion to assessment anew.				
			Asses	2 ECTS, Method of oral examination of Language of asses Only after success	f grading: numerical of one candidate eac ssment: German, En sful completion of mo	ch (approx. 30 minutes) glish if agreed upon wit	h the examiner cessful completion of r	nodule component 10-M-ZAL-1 or				
! 4	other prerequi	_		<del></del>		are listed in the sectio						
	Referred to in	LPO I	§ 73 (	1) 2. Mathematik Li	neare Algebra, Algel	ora und Elemente der Za	ahlentheorie					

10-M-NM1-082-	Numer	ical Mat	hematics	1								
mo1	ECTS	8	Duration		1 semester	Method of grading			Modul level	undergraduate		
	Course	S		V + Ü	(no information on	SWS (weekly contac	t hours) and course la	anguage avai	ilable)			
	Method	d of ass	essment	exam	vritten examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral xamination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes) anguage of assessment: German, English if agreed upon with the examiner							
	other prerequisites			tive on to the le sessi	ertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respec- ve details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admissi- in to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, are lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to as- essment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the quali- cation for admission to assessment anew.							
	Referre	d to in I	PO I	§ 73	(1) 5. Mathematik A	ngewandte Mathema	tik					
10-M-ST1-082-m01	Stocha	stics 1										
	ECTS 8 Duratio			1	1 semester	Method of grading	numerical grade		Modul level	undergraduate		
	Courses			V + Ü	Ü (no information on SWS (weekly contact hours) and course language available)							
	Method of assessment			exam	written examination (approx. 90 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) anguage of assessment: German, English if agreed upon with the examiner							
	other prerequisites			tive on to the le sessi	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.							
	Referre	d to in I	PO I	§ 73	§ 73 (1) 3. Mathematik Stochastik							
10-M-NM2-082-	Numer	ical Mat	hematics	2								
mo1	ECTS	5	Duration		1 semester	Method of grading			Modul level	undergraduate		
	Course		_				t hours) and course la					
				exam Lang	written examination (approx. 90 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			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.								
	Referre	d to in I	PO I	§ 73	(1) 5. Mathematik A	ngewandte Mathema	tik					

10-M-ST2-082-m01	Stochastics 2											
	ECTS	5	Duration	1	1 semester	Method of grading numerical grade	Modul level	undergraduate				
	Course	S		V + Ü	(no information or	SWS (weekly contact hours) and course language	available)					
	Method	d of asse	essment	exami	written examination (approx. 90 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) anguage of assessment: German, English if agreed upon with the examiner							
	other prerequisites			tive do on to the le- sessm	etails at the begin assessment. If stu cturer will put thei nent in the current	ust be met to qualify for admission to assessment. ning of the course. Registration for the course will be dents have obtained the qualification for admission registration for assessment into effect. Students wor in the subsequent semester. For assessment at a cassessment anew.	e considered a den n to assessment o who meet all prere	eclaration of will to seek admissi- over the course of the semester, equisites will be admitted to as-				
	Referre	d to in L	PO I	§ 73 (	3 (1) 3. Mathematik Stochastik							
10-M-VAN-082-	Advanc	ed Anal	ysis									
mo1	ECTS	8	Duration	ו	1 semester	Method of grading   numerical grade	Modul level	undergraduate				
	Courses			Ü + V	(no information or	SWS (weekly contact hours) and course language	available)					
	Method of assessment			written examination (approx. 90 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			on to the le	etails at the beging assessment. If stu cturer will put thei nent in the current	ust be met to qualify for admission to assessment. ining of the course. Registration for the course will be dents have obtained the qualification for admission registration for assessment into effect. Students wor in the subsequent semester. For assessment at a cassessment anew.	e considered a dent of to assessment of The meet all prere	eclaration of will to seek admissi- over the course of the semester, equisites will be admitted to as-				
	Referre	d to in L	PO I	§ 73 (	ı) 1. Mathematik A	nalysis						
10-M-MWR-092-	Modell	ing and	Computa	tional	Science							
mo1	ECTS	8	Duration		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			a) written examination (approx. 90 minutes; usually chosen) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)								

11-A4-072-m01	Astrop	hysics											
	ECTS	6	Duratio	n	1 semester	Method of grading	numerical grade	Modul level	undergraduate				
	Course	es		V + S	V + S (no information on SWS (weekly contact hours) and course language available)								
	Metho	d of ass	essment		written examination (approx. 120 minutes)								
	other p				Idmission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be med qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the ourse. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have btained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration or 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 and w.								
	cation	Participants and allo- cation of places				neral key skills (ASQ)	: 15 places. Places will b	e allocated by lot.					
11-EPP-092-m01	Introduction to Plasmaphysics												
	ECTS				1 semester	Method of grading		Modul level	graduate				
	Course						hours) and course langu	<u> </u>					
	Metho	d of ass	essment	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	etails at the beginni assessment. If stud cturer will put their i	ng of the course. Regents have obtained tregistration for asses r in the subsequents	ristration for the course we the qualification for admi sment into effect. Stude	will be considered a de ission to assessment on nts who meet all prere	nform students about the respect eclaration of will to seek admissioner the course of the semester, equisites will be admitted to as- ents will have to obtain the quali				

11-QM2-092-m01	Quantum Mechanics II											
	ECTS	8	Duration		1 semester	Method of grading	g numerical grade		Modul level	undergraduate		
	Course	S		R + V (	(no information on	SWS (weekly contac	t hours) and course langu	ıage ava	ilable)			
	Method	l of asse		prox. 1 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 plete: 1 to 4 weeks) en and how often as der observance of Se	with less than 4 ECTS cred or d) presentation/semina sessment will be offered of	dits app ar preser depends	rox. 20 minute ntation (approx s on the metho	oral examination in groups (aps) or c) project report (approx. 8 x. 30 minutes) d of assessment and will be anand examination regulations)		
	other p	rerequis		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.								
11-QVTP-092-m01	Many B	ody Qua	antum The	eory								
	ECTS	8	Duration	l	1 semester	Method of grading	numerical grade		Modul level	graduate		
	Course	S		R + V (	(no information on	SWS (weekly contact	t hours) and course langu	ıage ava	ilable)			
	Method	l of asse		prox. 3 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 plete: 1 to 4 weeks) en and how often as der observance of Se	with less than 4 ECTS cred or d) presentation/semina sessment will be offered of	dits app ar preser depends	rox. 20 minute ntation (approx s on the metho	oral examination in groups (aps) or c) project report (approx. 8 x. 30 minutes) d of assessment and will be anand examination regulations)		
	other p	rerequis		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.								

11-RMS-092-m01	Relativistic Effects in Mesoscopic Systems											
	ECTS	5 Duratio	n	1 semester	Method of grading	numerical grade	Modul level	graduate				
	Courses	5	R + V	R + V (no information on SWS (weekly contact hours) and course language available)								
	Method	of assessment	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 pi	rerequisites	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.									
11-TFK-092-m01	Theoretical Solid State Physics											
	ECTS	8 Duratio	n	1 semester	Method of grading	numerical grade	Modul level	graduate				
	Courses	5	R + V	(no information o	n SWS (weekly contac	t hours) and course language av	/ailable)					
	Method	of assessment	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups prox. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx 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 nounced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulation 2009.  Language of assessment: German, English									
	other pi	rerequisites	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.									

11-TSL-092-m01	Theory of Superconduction											
	ECTS 5	Duration	1	1 semester	Method of grading numerica	l grade	Modul level	graduate				
	Courses		R + V	(no information on	SWS (weekly contact hours) and	l course language av	ailable)					
	Method o	of assessment	prox. to 10   Asses nound 2009.	30 minutes per can pages, time to com sment offered: Who ced in due form und	didate, for modules with less th plete: 1 to 4 weeks) or d) presen en and how often assessment w ler observance of Section 32 Su	an 4 ECTS credits ap tation/seminar pres- ill be offered depend	prox. 20 minute entation (approx ds on the metho	d of assessment and will be an-				
	other pre	erequisites	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.									
11-PKS-092-m01	Physics of Complex Systems  Complex Systems											
	ECTS 6	5 Duration	1	1 semester	Method of grading numerica	l grade	Modul level	graduate				
	Courses		R + V	(no information on	SWS (weekly contact hours) and	l course language av	ailable)					
	Method o	of assessment	prox. to 10   Asses nound 2009.	30 minutes per can pages, time to com sment offered: Who ced in due form und	didate, for modules with less th plete: 1 to 4 weeks) or d) presen en and how often assessment w ler observance of Section 32 Sul	an 4 ECTS credits ap tation/seminar pres ill be offered depend	prox. 20 minute entation (approx ds on the metho	d of assessment and will be an-				
	other pre	erequisites	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.									

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 of	R + V (no information on SWS (weekly contact hours) and course language available)								
	Method 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									
	other prerequi		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.									
11-SDC-092-m01	Statistics, Data Analysis and Computer Physics											
	ECTS 4	Duration	1 semester	Method of grading numerical grade		Modul level	graduate					
	Courses		R + V (no information of	on SWS (weekly contact hours) and course la	inguage ava	ailable)						
	Method of ass		a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups of prox. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx 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 nounced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations 2009.  Language of assessment: German, English									
	other prerequi		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.									

11-AKM-092-m01	Cosmology												
	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)					
	Method	l 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 wellete: 1 to 4 weeks) of en and how often assider observance of Sec	with less than 4 ECTS credits or d) presentation/seminar pro- essment will be offered depe	approx. 20 minute esentation (appro ends on the metho	oral examination in groups (apes) or c) project report (approx. 8 x. 30 minutes) d of assessment and will be anand examination regulations)				
	other p	rerequis		tive do on to the le	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.								
11-APL-092-m01	Plasma	ma-Astrophysics											
	ECTS 6 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)					
	Method	l of asse	essment	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 wellete: 1 to 4 weeks) of en and how often assider observance of Sec	with less than 4 ECTS credits or r d) presentation/seminar pro essment will be offered depe	approx. 20 minute esentation (appro ends on the metho	oral examination in groups (apes) or c) project report (approx. 8 x. 30 minutes) d of assessment and will be anand examination regulations)				
	other p	rerequis		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.									

11-GRT-092-m01	Group 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)					
	Method	d of ass		prox. 3 to 10 p Asses nounc 2009.	anguage of assessment: German, English								
	other p	rerequi		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.									
11-NMA-092-m01	Numerical Methods in Astrophysics												
	ECTS 6 Duratio				1 semester	Method of grading	numerical grade	Modul level	graduate				
	Course	S	,	V + Ü (	(no information on	SWS (weekly contact	hours) and course language av	ailable)					
	Method	d 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									
	other p	rerequi		tive de on to a the lea sessm	etails at the beginn assessment. If stuc cturer will put their nent in the current o	ing of the course. Reg lents have obtained t registration for asses	gistration for the course will be on the qualification for admission to sment into effect. Students who	considered a de to assessment o o meet all prere	form students about the respec- claration of will to seek admissi- ver the course of the semester, quisites will be admitted to as- nts will have to obtain the quali-				

11-QFT2-092-m01	Quantun	n Field Theory I										
	ECTS	6 Duratio	1	1 semester	Method of grading	numerical grade	Modul level	graduate				
	Courses		R + V	(no information or	SWS (weekly contac	t hours) and course languag	e available)					
	Method	of assessment	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 pre	erequisites	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.									
11-RNT-092-m01	Renormalization Theory											
	ECTS	6 Duratio	on 1 semester Method of grading numerical grade				Modul level	graduate				
	Courses		R + V	(no information or	SWS (weekly contac	t hours) and course languag	e available)					
	Method	of assessment	prox. to 10 Asses nound 2009.	30 minutes per ca pages, time to con ssment offered: Wh ced in due form un	ndidate, for modules aplete: 1 to 4 weeks) aen and how often as	with less than 4 ECTS credit or d) presentation/seminar p sessment will be offered dep	s approx. 20 minutoresentation (appropends on the metho	r oral examination in groups (apes) or c) project report (approx. 8 x. 30 minutes) od of assessment and will be anand examination regulations)				
	other pre	erequisites	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.									

11-RQFT-092-m01	Relativ	istical C	Quantumfi	eld Th	eory							
	ECTS	8	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 ava	ailable)				
	Method	d of asse		prox. to 10 p Asses nound 2009.	anguage of assessment: German, English							
	other p	rerequis		on to the le	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.							
11-RTT-092-m01	Theory of Relativity											
	ECTS 6 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 ava	ailable)				
	Method	d of asse	essment	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups prox. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (app 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 b nounced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulation 2009.  Language of assessment: German, English								
	other p	rerequis		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.								

11-TEP-092-m01	Theoretical Elementary Particle Physics												
	ECTS	8	Duration	1 semester	Method of grading numerical grade	Modul level	graduate						
	Courses	S	R + V	(no information on	SWS (weekly contact hours) and course language av	ailable)							
	Method	l of asse	prox. to 10 Asses noun 2009	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 p	rerequisi	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 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.									
11-TPE-092-m01	Experimental Particle Physics  ECTS 4 Duration 1 semester Method of grading numerical grade Modul level graduate												
	ECTS	4	Duration	1 semester	graduate								
	Courses	s	R + V	(no information on	SWS (weekly contact hours) and course language av	ailable)							
	Method	l of asse	prox. to 10 Asses noun 2009	30 minutes per can pages, time to com ssment offered: Who ced in due form und	pprox. 90 minutes) or b) oral examination of one caldidate, for modules with less than 4 ECTS credits applete: 1 to 4 weeks) or d) presentation/seminar present and how often assessment will be offered dependent of the contract of Section 32 Subsection 3 ASPO (general derman, English	prox. 20 minute entation (approx Is on the metho	es) or c) project report (approx. 8 x. 30 minutes) d of assessment and will be an-						
	other p	rerequis	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 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.									

11-TPS-092-m01	Particle	Physics (Stand	ard Mo	odel)							
	ECTS	8 Duratio	n	1 semester	Method of grading   r	numerical grade	Modul level	graduate			
	Courses	5	R + V	(no information or	n SWS (weekly contact h	ours) and course language ava	ailable)				
	Method	of assessment	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 pi	rerequisites	tive don to the le	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.							
11-SUS-092-m01	Supersymmetry I and II										
	ECTS	6 Duratio	n	1 semester	Method of grading r	numerical grade	Modul level	graduate			
	Courses	5	V + R	V + R (no information on SWS (weekly contact hours) and course language available)							
	Method	of assessment	prox. to 10 Asses noun 2009	30 minutes per ca pages, time to cor ssment offered: W ced in due form ur	ndidate, for modules wit nplete: 1 to 4 weeks) or c hen and how often asses	th less than 4 ECTS credits ap d) presentation/seminar presessment will be offered depend	prox. 20 minute entation (approx Is on the metho	oral examination in groups (apes) or c) project report (approx. 8 x. 30 minutes) d of assessment and will be anand examination regulations)			
	other pi	rerequisites	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 admiss 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 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.								

11-KM-092-m01	Conder	nsed Ma	atter (Qua	nta, A	toms, Molecules,	Solid State Physics)							
	ECTS	16	Duration	ı	2 semester	Method of grading	numerical grade	Modul level	undergraduate				
	Course	S		hours Kond	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	d of ass	essment	1. Top pro 2. Top pro 3. Top usi	pics covered in lead on the second of the se	ctures and exercises in ctures and exercises in rritten examination (app	part 1 (Kondensierte Ma part 2 (Kondensierte Ma parts 1 and 2: oral exam prox. 120 minutes).	aterie 2 (Condensed Ma	tter 1)): written examination (apatter 2)): written examination (apatter 2), written examination (apatter 2), written examination (apatter 2).				
				Assessment component 3 will be offered in German; English if agreed upon with examiner(s).  Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2.  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. 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.									
11-KET-092-m01	Nuclea	r and El	ementary	Partic	Particle Physics								
	ECTS	4	Duration	ı	1 semester	Method of grading	numerical grade	Modul level	undergraduate				
	Course	S		V + Ü	(no information of	on SWS (weekly contact	hours) and course lang	guage available)					
	Method	d of ass	essment	writte speci		pprox. 120 minutes, for	modules with less than	n 4 ECTS credits approx.	. 90 minutes; unless otherwise				
	other p	rerequi	sites	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 admiss 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 assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qual fication for admission to assessment anew.									
11-AST-092-m01	Theore	tical As	trophysic										
	ECTS	6	Duration										
	Course	Courses			R + V (no information on SWS (weekly contact hours) and course language available)								
	Method of assessment			written examination (approx. 120 minutes)									

11-FKP-092-m01	Solid State Physics 1													
_	ECTS	8	Duration	ı	1 semester	Method of grading	numerical grade	Modul level	undergraduate					
	Courses	S		V + Ü	(no information on	SWS (weekly contact	hours) and course language av	/ailable)	•					
	Method	l of ass	essment	speci <sup>s</sup> Asses	ritten examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; unless otherwise pecified) ssessment offered: When and how often assessment will be offered depends on the method of assessment and will be anounced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 009.  The error of 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, ne 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 qualication for admission to assessment anew.									
	other p	rerequi	sites	tive d on to the le sessn										
11-QAM-092-m01	Quanta	, Atom	s, Molecu	ecules										
	ECTS	8	Duratio	ı	1 semester	Method of grading	numerical grade	Modul level	undergraduate					
	Courses	S		Ü + Ü	J + Ü (no information on SWS (weekly contact hours) and course language available)									
	Method of assessment			speci Asses nound	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	tive d on to the le sessn	ertain 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, ne 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 qualication for admission to assessment anew.									
Thesis (10 ECTS cre	edits)													
10-M-BAP-092-	Thesis	Mather	natical Ph	ysics (	(Bachelor Thesis)									
mo1	ECTS	10	Duratio	ion 1 semester Method of grading numerical grade Modul level undergraduate										
	Courses	S		(no information on SWS (weekly contact hours) and course language available)										
	Method of assessment			written thesis Language of assessment: German, English if agreed upon with the examiner										
	other prerequisites			Regis	Registration for assessment: as specified.									

Subject-specific K	ey Skills												
Key Skills 1 (Comp	ulsory) (	5 ECTS	credits)										
10-M-VKM-082-	Prepara	atory Co	urse Mat	hemat	ics								
mo1	ECTS	1	Duratio	n	1 semester	Method of grading	(not) successfully completed	Modul level	undergraduate				
	Course	S			V + Ü (no information on SWS (weekly contact hours) and course language available)								
	Method of assessment			Asses	project assignments (type and expenditure of time to be specified by the lecturer at the beginning of the course) Assessment offered: once a year, winter semester Language of assessment: German, English if agreed upon with the examiner								
	other p	rerequi	sites	Admis	ssion prerequisite to	assessment: regula	r attendance of courses (as spe	cified at the be	ginning of the course).				
11-SMP-092-m01	Seminar Mathematical Physics												
	ECTS	4	Duratio	n	1 semester	Method of grading	numerical grade	Modul level	undergraduate				
	Course	S		S (no	information on SWS	(weekly contact hou	rs) and course language availa	ble)					
Key Skills 2 (Electi	other p	rerequi	sites	nound 2009. Langu	ced in due form undo lage of assessment:	er observance of Sec German, English if a	essment will be offered depend tion 32 Subsection 3 ASPO (geo greed upon with the examiner r attendance and successful pr	neral academic					
		out of	the two n	nodule	s 10-M-COM and 10-	M-COMg or, respecti	vely, out of the two modules 10	-M-PRG and 10-	M-PRGk.				
11-A4-072-m01	Astropl												
	ECTS	6	Duratio		1 semester	Method of grading		Modul level	undergraduate				
	Course						hours) and course language av	ailable)					
	Method	d of ass	essment		n examination (appr	•							
	other p	rerequi	sites	to qua cours obtain for as	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 an ew.								
	Particip cation (			Only a	as part of pool of ger	neral key skills (ASQ)	: 15 places. Places will be alloc	ated by lot.					

10-M-BSA-072-	Semina	ır in An	alysis		-				<del>.</del>				
mo1	ECTS	5	Duratio	n	1 semester	Method of grading numer	ical grade	Modul level	undergraduate				
	Course	S		S (no	information on SV	VS (weekly contact hours) and	course language availa	ıble)					
	Method	d of ass	essment		approx. 60 minute								
					Assessment offered: in the semester in which the course is offered								
	D (	1	1.00.1		anguage of assessment: German, English if agreed upon with the examiner								
M DCI	Referre				§ 73 (1) 1. Mathematik Analysis								
10-M-BSL-072-m01					,	1							
		5	Duratio		1 semester	Method of grading numer		Modul level	undergraduate				
	Course					VS (weekly contact hours) and	course language availa	ible)	_				
	Method	l of ass	sessment		approx. 60 minute		rsa is offered						
					ssessment offered: in the semester in which the course is offered inguage of assessment: German, English if agreed upon with the examiner								
	Referred to in LPO I				3 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie								
10-M-BSE-072-	Semina	ar in Alg	gebra										
mo1	ECTS 5 Duration			n	1 semester	Method of grading numer	ical grade	Modul level	undergraduate				
	Course	S	•	S (no	information on SV	VS (weekly contact hours) and	course language availa	ıble)					
	Method	d of ass	essment		approx. 60 minute								
					Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner								
	Referred to in LPO I						<u>'</u>						
A M DCC and				8/3	73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie								
10-M-BSG-072- m01	<b>Semina</b> ECTS				L competer	Mathad of avading human	ical avada	Madullaval	Lundo rara duata				
		5	Duratio		1 semester Method of grading numerical grade Modul level undergraduate 5 (no information on SWS (weekly contact hours) and course language available)								
	Course						course language availa	ible)	_				
	Method	i or ass	sessment		approx. 60 minute		rse is offered						
					Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner								
	Referre	d to in	LPO I	§ 73 (	§ 73 (1) 4. Mathematik Geometrie								
10-M-BSZ-072-	Semina	ır in Nu	mber The	ory									
mo1	ECTS	5	Duratio	n	1 semester	Method of grading numer	ical grade	Modul level	undergraduate				
	Course	S		S (no	S (no information on SWS (weekly contact hours) and course language available)								
	Method	d of ass	essment		alk (approx. 60 minutes)								
					Assessment offered: in the semester in which the course is offered								
				Language of assessment: German, English if agreed upon with the examiner									
	Referred to in LPO I			8 73 (	§ 73 (1) 2. Mathematik Lineare Algebra, Algebra und Elemente der Zahlentheorie								

10-M-BSC-072-	Semina	r in Co	mplex Ana	alysis			,	,						
mo1	ECTS	5	Duratio	า	1 semester	Method of grading	numerical grade	Modul level	undergraduate					
	Courses	S		S (no	information on SWS	(weekly contact hou	urs) and course langua	ge available)						
	Method	of ass	essment		approx. 60 minutes)									
							the course is offered							
					Language of assessment: German, English if agreed upon with the examiner									
	Referre			- , -	73 (1) 1. Mathematik Analysis									
10-M-BSN-072-			merical M											
mo1		5	Duratio		1 semester	Method of grading		Modul level	undergraduate					
	Courses						urs) and course langua	ge available)	_					
	Method	l of ass	essment	Asses		sment offered: in the semester in which the course is offered age of assessment: German, English if agreed upon with the examiner								
	Referre	d to in	LPO I	§ 73 (	73 (1) 5. Mathematik Angewandte Mathematik									
10-M-BSS-072-	Semina	r in Sto	chastics					,						
mo1	ECTS 5 Duratio		1	1 semester	Method of grading	numerical grade	Modul level	undergraduate						
	Courses	S		S (no	information on SWS	(weekly contact hou	urs) and course langua	ge available)						
	Method of assessment			Asses	talk (approx. 60 minutes) Assessment offered: in the semester in which the course is offered Language of assessment: German, English if agreed upon with the examiner									
	Referre	d to in	LPO I	§ 73 (	§ 73 (1) 3. Mathematik Stochastik									
10-M-BSF-072-m01	1 Seminar in Functional Analysis													
	ECTS	5	Duratio	า	1 semester	Method of grading	numerical grade	Modul level	undergraduate					
	Courses	S	,	S (no	S (no information on SWS (weekly contact hours) and course language available)									
	Method	of ass	essment	talk (a	approx. 60 minutes)									
10-M-BSO-072-	Semina	r in Op	eration R	esearc	h									
mo1	ECTS	5	Duratio	1	1 semester	Method of grading	numerical grade	Modul level	undergraduate					
	Courses	S		S (no	information on SWS	(weekly contact hou	urs) and course langua	ge available)						
	Method	of ass	essment	talk (a	talk (approx. 60 minutes)									
10-M-BSD-072-	Semina	r in Dis	crete Mat	hemat										
mo1	ECTS	5	Duration			Method of grading numerical grade		Modul level	undergraduate					
	Courses	S		S (no	information on SWS	(weekly contact hou	urs) and course langua	ge available)						
	Method	of ass	essment	talk (a	approx. 60 minutes)		<u> </u>							

10-M-COMg-082-	Comput	tationa	Mathem	atics,	advanced	1	,			<del>.</del>			
mo1	ECTS	4	Duration	า	1 semester	Method of gradi	ng (not) successful	lly completed	Modul level	undergraduate			
	Courses	S		Ü + V	(no information on	SWS (weekly cont	act hours) and cours	se language av	vailable)				
	Method	l of ass	essment	the co	project in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of the course) Assessment offered: once a year, summer semester Language of assessment: German, English if agreed upon with the examiner								
	other p	rerequi	sites	Admi	dmission prerequisite to assessment: regular attendance of exercises (attendance monitored, a maximum of one incident of nexcused absence).								
	Referre	d to in l	-PO I	§ 73 (	1) 5. Mathematik A	ngewandte Mather	matik						
10-M-PRGk-082-	Progran	mming	course fo	r stude	ents of Mathematic	s and other subjec	ts, simple						
mo1	ECTS	2	Duration		1 semester		ng (not) successful			undergraduate			
	Courses	S		P (no	o information on SWS (weekly contact hours) and course language available)								
	Method	l of ass	essment	the co	oct in the form of programming exercises (type and expenditure of time to be specified by the lecturer at the beginning of ourse) uage of assessment: German, English if agreed upon with the examiner								
	other p			abser	Admission prerequisite to assessment: regular attendance (attendance monitored, a maximum of one incident of unexcused absence).								
	Referred to in LPO I			§ 73 (	1) 5. Mathematik A	ngewandte Mather	natik						
10-M-RCN-082-		g Cours	e Numeri	cal Ma	thematics								
mo1	ECTS	4	Duration		1 semester		ng   numerical grade		Modul level	undergraduate			
	Courses				A (no information on SWS (weekly contact hours) and course language available)								
					a) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)								
10-M-RCS-082-		g Cours	e Stocha	stics									
m01	ECTS	4	Duration		1 semester		ng   numerical grade		Modul level	undergraduate			
	Courses		_				hours) and course la		able)				
						tes) or b) written el	aboration (approx. 5	to 10 pages)					
10-M-RCD-082-	Reading	g Cours	e Discret	e Math	ematics								
mo1	ECTS	4	Duration		1 semester		ng   numerical grade		Modul level	undergraduate			
	Courses	S		A (no	A (no information on SWS (weekly contact hours) and course language available)								
	Method	of ass	essment	a) tall	a) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)								
10-M-RCF-082-m01	Reading	g Cours	e Functio	ional Analysis									
	ECTS	4	Duratio	1	1 semester	Method of gradi	ng numerical grade	9	Modul level	undergraduate			
	Courses	S		A (no	information on SW	/S (weekly contact	hours) and course la	ınguage availa	able)				
	Method	of ass	essment	a) tall	k (approx. 30 minu	tes) or b) written el	aboration (approx. 5	to 10 pages)					

10-M-RCO-082-	Reading Course Operations Research											
m01	ECTS 4 Duratio		1 sei	mester	Method of grading	numerical grade	Modul level	undergraduate				
	Courses		A (no information on SWS (weekly contact hours) and course language available)									
	Method of as	sessment	a) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)									
10-M-RCY-082-	Reading Course Dynamical Systems											
m01	ECTS 4	Duratio	1 sei	mester	Method of grading	numerical grade	Modul level	undergraduate				
	Courses		A (no information on SWS (weekly contact hours) and course language available)									
	Method of as	sessment	a) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)									
10-M-RCP-082-	Reading Course Optimisation											
mo1	ECTS 4	Duratio	n 1 semester		Method of grading	d of grading numerical grade		undergraduate				
	Courses		A (no information on SWS (weekly contact hours) and course language available)									
	Method of as	sessment	a) talk (approx. 30 minutes) or b) written elaboration (approx. 5 to 10 pages)									
10-M-PRG-082- m01	Programming course for students of Mathematics and other subjects											
	ECTS 3	Duratio	1 sei	mester	Method of grading	(not) successfully complete	d Modul level	undergraduate				
	Courses	·	P (no inforr	nation on SWS	(weekly contact ho	urs) and course language ava	ilable)					
	Method of as	sessment	project in the form of programming exercises (as specified at the beginning of the course)									
			Language of assessment: German, English if agreed upon with the examiner									
	other prereq	uisites	Admission prerequisite to assessment: regular attendance (attendance monitored, a maximum of one incident of unexcused									
	D - f 1 t - :-	- I DO I	absence).									
12 M COM 202	Referred to in		- ,	§ 73 (1) 5. Mathematik Angewandte Mathematik								
10-M-COM-082- mo1	Computeroriented Mathematics  ECTS 3 Duration 1 semester Method of grading (not) successfully completed Modul level undergraduate											
11101	ECTS 3	Duratio				, ,		undergraduate				
	Courses		V + Ü (no information on SWS (weekly contact hours) and course language available)									
	Method of as	ssessment	project in the form of programming exercises (as specified at the beginning of the course) Assessment offered: once a year, summer semester									
			Language of assessment: German, English if agreed upon with the examiner									
	other prereq	uisites	Admission prerequisite to assessment: regular attendance of exercises (attendance monitored, a maximum of one incident of									
			unexcused absence).									
	Referred to in	ı LPO I	§ 73 (1) 5. Mathematik Angewandte Mathematik									
11-HS-092-m01	Advanced Seminar Experimental/Theoretical Physics											
	ECTS 4	Duratio		mester	Method of grading		Modul level	undergraduate				
	Courses		S (no information on SWS (weekly contact hours) and course language available)									
	Method of as	sessment	talk (approx. 30 to 45 minutes) with discussion 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 prereq	uisites	Admission prerequisite to assessment: regular attendance and successful preparation of seminar presentation.									
	James Preseg			r. 5. 5 9 315115 10			F. 5 P S. S. C. 1011 01 50					

11-A1-092-m01	Computational Physics										
	ECTS	6	Duration		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			written examination (approx. 120 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.							
	other prerequisites		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.								
	Participants and allo- cation of places			Only as part of pool of general key skills (ASQ): 15 places. Places will be allocated by lot.							