

Module Catalogue for the Subject

FOKUS Physics

as a Master's with 1 major with the degree "Master of Science" (120 ECTS credits)

Examination regulations version: 2011 Responsible: Faculty of Physics and Astronomy

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 88|e07|-|-|H|2011

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The subject is divided into

section / sub-section	FCTS credits	starting
Section / Sub-Section		page
Compulsory Courses	54	10
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Complex Systems, Quantum Control and Biophysics (Experi-		05
ment)		95
Current Topics in Experimental Physics		106
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Applied Physics and Metrology (Theory)		114
Solid State Physics and Nanostructures (Theory)		123
Astrophysics and Particle Physics (Theory)		151
Complex Systems, Quantum Control and Biophysics (Theory)		195
Current Topics in Theoretical Physics		202
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Content and Objectives of the Programme

The FOKUS master study program is a special course, which provides on the one hand short time study (only 8 semesters in a consecutive Bachelor and Master program) and on the other hand puts significant emphasis on early integration of research activities. This Master study program is embedded an financed through the »Elitenetzwerk Bayern« (ENB). The master course is especially preparing the students for their later scientific work in the field of Physics. Qualified graduates may pursue doctoral work (degree Dr. rer. nat.) at doctorate-granting institutions. The goal of the studies is it to mediate special knowledge on the most important subsections of the experimental and theoretical physics and to make the students familiar with the methods of scientific and physical thinking and working. By training of analytic thinking abilities the students acquire the ability to deal later with the various fields of applications and to compile the special knowledge obtained within the Bachelor programme. During the Master thesis the student should independently work on a new thematic and temporally limited experimental or theoretical engineering-scientific task in the field of experimental or theoretical physics using well-known procedures and scientific criteria.

Abbreviations used

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

Term: **SS** = summer semester, **WS** = winter semester

Methods of grading: **NUM** = numerical grade, **B/NB** = (not) successfully completed

Regulations: **(L)ASPO** = general academic and examination regulations (for teaching-degree programmes), **FSB** = subject-specific provisions, **SFB** = list of modules

Other: **A** = thesis, **LV** = course(s), **PL** = assessment(s), **TN** = participants, **VL** = prerequisite(s)

Conventions

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

Notes

Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method 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 the module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.

Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

In accordance with

the general regulations governing the degree subject described in this module catalogue:

ASP02009

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

29-Jun-2011 (2011-40) except for mandatory electives added in Fast Track procedure at a later time

25-Mar-2013 (2012-185) except for mandatory electives added in Fast Track procedure at a later time

26-Sep-2012 (2012-33) except for mandatory electives added in Fast Track procedure at a later time

o4-Nov-2014 (2014-71) except for mandatory electives added in Fast Track procedure at a later time

17-Dec-2014 (2014-85)

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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.



Compulsory Courses

(54 ECTS credits)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	ра
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title			Abbreviation		
Advanced Seminar Experimental/Theoretical Physics			11-OSP-072-m01		
Module	coord	inator		Module offered by	
Managi the Inst	ng Dire itute o	ectors of the Institute of A f Theoretical Physics and	pplied Physics and Astrophysics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
4	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Semina	ir on cu	rrent issues of Theoretica	al or Experimental Ph	ysics.	
Intende	ed learr	ning outcomes			
The stu are able a profe	dents ł e to ext ssional	nave advanced knowledg ract knowledge from prof audience.	e of a current special fessional publication	ist field of Experime s and to summarise	ntal or Theoretical Physics. They this knowledge and present it to
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
S (no in	Iformat	ion on SWS (weekly cont	act hours) and cours	e language available	2)
Methoo module is	l of ass creditab	e essment (type, scope, langua) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
talk wit	h discu	ıssion (approx. 30 to 45 r	ninutes)		
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
Teachir	ng cycl	9			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	irs in			
Master'	s degre	ee (1 major) Physics (2010	o)		
Master'	s degre	ee (1 major) Physics (201	1)		
Master'	s degre	ee (1 major) FOKUS Physic	CS (2010)		
Master Master	Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)				

Module title			Abbreviation		
Advanced Practical Course Master 11-PFM-111-m01				11-PFM-111-m01	
Module coordinator Module offered			Module offered by		
Managi	ng Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Princip stems, tic reso superco	les of N proper nance onduct	luclear, Atomic and Mole ties of solids, surfaces ar (NMR) - quantum Hall eff ivity - laser - solid-state o	cular Physics, experin nd interfaces. Experin ect - optical pumping ptics	ments on cryogenic t nents on the followir and spectroscopy ir	temperatures and correlated sy- ng topics: X-rays - nuclear magne- n the field of optics - Hall effect -
Intende	ed leari	ning outcomes			
Knowle suing s experin experin	dge of cientifi nental nent an	conducting experiments, c publications, applications methods. They are able to d to present and discuss	analysing and docur on of modern evaluat o work on a task on th their results in a scie	nenting experimenta ion systems. The stu ne basis of publication entific publication.	al results, basic knowledge of is- idents are familiar with modern ons, to conduct and evaluate an
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Prep se	minar	for Fortgeschrittenen-Pra	ktikum Master (Advai	nced Practical Cours	e Master): S (1 weekly contact
Fortges man or	chritte Englisi	nen-Praktikum Master (A า	dvanced Practical Co	urse Master) Part 1: I	P (3 weekly contact hours), Ger-
Fortges	chritte	nen-Praktikum Master (A	dvanced Practical Co	urse Master) Part 2:	P (3 weekly contact hours), Ger-
Fortges man or	chritte Englisi	nen-Praktikum Master (A n	dvanced Practical Co	urse Master) Part 3:	P (3 weekly contact hours), Ger-
Methoo module is	d of ass creditab	eessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
This mo 1. Prep (app	odule h semina rox. 5 te	as the following assessn ar for Fortgeschrittenen-P o 10 minutes)	nent components Traktikum Master (Adv	vanced Practical Cou	rse Master): oral examination
 Lab course in part 1 (Fortgeschrittenen-Praktikum Master/Advanced Practical Course Master Part 1): a) Preparing the experiment will be considered successfully completed if an oral test (approx. 30 minutes) is passed prior to the experiment. b) Performing and evaluating the experiment will be considered successfully completed if a test is passed. Students must prepare an experiment log (approx. 8 pages). Lab course in part 2 (Fortgeschrittenen-Praktikum Master/Advanced Practical Course Master Part 2): a) Preparing the experiment will be considered successfully completed if an oral test (approx. 30 minutes) is passed prior to the experiment will be considered successfully completed if an oral test (approx. 30 minutes) is passed prior to the experiment. b) Performing and evaluating the experiment will be considered successfully completed if a test is passed. Students must prepare an experiment log (approx. 8 pages). Lab course in part 3 (Fortgeschrittenen-Praktikum Master/Advanced Practical Course Master Part 3): a) Preparing the experiment will be considered successfully completed if an oral test (approx. 30 minutes) is passed prior to the experiment. b) Performing and evaluating the experiment log (approx. 8 pages). Lab course in part 3 (Fortgeschrittenen-Praktikum Master/Advanced Practical Course Master Part 3): a) Preparing the experiment will be considered successfully completed if an oral test (approx. 30 minutes) is passed prior to the experiment will be considered successfully completed if an oral test (approx. 30 minutes) is passed prior to the experiment. b) Performing and evaluating the experiment will be considered successfully completed if a test is passed. Students must prepare an experiment log (approx. 8 pages). Lab course in part 3 (Fortgeschrittenen Praktikum Master/Advanced Practical Course Master Part 3): a) Preparing the experiment will be considered successfully completed if an oral test (approx. 30 minutes) is passed prior to t					
Language of assessment: German or English Students must register for assessment components 1 through 4 online (details to be announced). Only those students who have attended the prep seminar for Fortgeschrittenen-Praktikum Master (Advanced Practical Course Master) will be allowed to perform experiments as part of the courses Fortgeschrittenen-Prakti- kum Master Parts 1 through 3.					

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Students will be offered one opportunity to retake element a) and/or element b) in the respective semester. To pass an assessment component, they must pass both elements (a and b) in the same semester. To pass this module, students must pass each of the assessment components 1 through 4.

Allocation of places

Additional information

Workload

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) FOKUS Physics (2011)

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Module title				Abbreviation		
FOKUS Project Practical Course Physics11-FPP-072-m01					11-FPP-072-m01	
Module coordinator Module offered b			Module offered by			
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its					
Indepe scienti	ndent v fic expe	vork on a current researc eriments including analys	h topic of Experiment is and documentatio	al and Theoretical P n of the results.	hysics and implementation of	
Intende	ed learı	ning outcomes				
The stu conduc	idents a ct and a	are able to independently nalyse scientific experim	v work on a current re ents and to documer	search area of Exper nt the results.	imental or Theoretical Physics, to	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
P (no ir	nformat	ion on SWS (weekly cont	act hours) and cours	e language available)	
Metho module is	d of ass s creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
placement report / fieldwork report / report on practical training / report on practical course / project report / re- port on technical course (approx. 20 pages) and talk (approx. 30 minutes) on respective topic researched						
Allocation of places						
Additional information						
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) FOKUS Physics (2010)						
Master's degree (1 major) FOKUS Physics (2011)						
Master's degree (1 major) FOKUS Physics (2006)						

Module title					Abbreviation	
Professional Specialization FOKUS Physics 11-FS-PF-072-m01					11-FS-PF-072-m01	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee		Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
15	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Introdu to the p on.	iction to planneo	o current experimental or I topic of the Master's the	theoretical question esis. Summary of the	s of a subdiscipline required fundament	of Physics with special relevance tal topics in a seminar presentati-	
Intende	ed lear	ning outcomes				
The stu a speci area ar	idents l ial relev id are a	have advanced knowledg vance to the intended top ble to summarise their k	e of a current experir ic of the Master's the nowledge in an oral p	nental or theoretical esis. They know the o presentation.	subdiscipline of Physics with current state of research in this	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
S (no ir	nformat	ion on SWS (weekly cont	act hours) and cours	e language available	e)	
Metho module is	d of ass s creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
talk wit	th discu	ussion (approx. 30 to 45 r	ninutes)			
Allocat	ion of r	blaces	15(15)1			
Additio	onal inf	ormation				
Worklo	ad					
Teachi	Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master	Master's degree (1 major) FOKUS Physics (2010)					
Master	's degr	ee (1 major) FOKUS Physi	cs (2011)			
Master	Master's degree (1 major) FUKUS Physics (2006)					

Module title Abbrevi					Abbreviation	
Scientific Methods and Project Management FOKUS Physics				5	11-MP-PF-072-m01	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee	_	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
15	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	Its					
Introdu theorei thesis.	uction to tical an	o the methods of scientif d experimental questions	ic work, taking into a s of Physics, writing c	ccount methods of p of a scientific project	roject planning. Application to plan for the planned Master's	
Intend	ed lear	ning outcomes				
The stu thods o topic o experir	idents l of a cur f the M mental	have knowledge of scient rent experimental and the aster's thesis. They are a or theoretical work. They	ific methods and me eoretical subdisciplir ble to draft a project are able to describe	thodological work, in ne of Physics with sp plan for the Master's their projects in oral	ncluding project planning me- ecial relevance to the intended thesis and to plan the required presentations.	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
R (no ir	nformat	ion on SWS (weekly cont	act hours) and cours	e language available)	
Metho module is	d of ass s creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
talk wi Langua	th discu age of a	ussion (approx. 30 to 45 r ssessment: German or Ei	ninutes) 1glish			
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master	's degr	ee (1 major) FOKUS Physi	cs (2010)			
Master	's degr	ee (1 major) FOKUS Physi	cs (2011)			
Master	Master's degree (1 major) FOKUS Physics (2006)					





Compulsory Electives

(36 ECTS credits)



Specialisation Physic

(20 ECTS credits)

Modules worth a total of 20 ECTS credits must be successfully completed. Of these 41 ECTS credits, no less than 5 are to be achieved in the sub-area "Experimentelle Physik" ("Experimental Physics") and in the sub-area "Theoretische Physik" ("Theoretical Physics") each.



Experimental Physics

(ECTS credits)

Students must achieve a minimum of 5 ECTS credits.



Applied Physics and Metrology (Experiment)

(ECTS credits)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.
	data record Master (120 ECTS) FOKUS Physik - 2011

Module title					Abbreviation		
Electro	nics				11-A2-092-m01		
Module	coord	inator		Module offered by			
Managi	ng Dire	ector of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. con	Only after succ. compl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semester undergraduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment it sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew				
Conten	ts						
Principl coils ar cuits: d	les of e nd diod ifferen	lectronic components a es) and active compon t types of gates and CM	and circuits. Analogous ents (bipolar and field- IOS circuits. Microcont	s circuit technology: effect transistors, op roller	Passive (resistors, ca perational amplifiers	apacitors,). Digital cir-	
Intende	ed learr	ning outcomes					
The stu circuit t	dents ł echnol	nave knowledge of the ogy.	practical setup of elect	ronic circuits from th	e field of analogous	and digital	
Course	S (type, n	umber of weekly contact hour	s, language — if other than Ger	rman)			
V + Ü (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)		
Methoo module is	d of ass creditab	s essment (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether	
written Assess and wil examin	examir ment o l be an ation re	nation (approx. 90 min ffered: When and how nounced in due form u egulations) 2009.	utes) often assessment will b nder observance of Sec	be offered depends of the section 32 Subsection 3	on the method of ass 3 ASPO (general aca	essment demic and	
Allocat	ion of p	olaces					
Only as	part o	f pool of general key sk	ills (ASQ): 15 places. P	laces will be allocate	ed by lot.		
Additio	nal info	ormation					
Worklo	ad						
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Bachelor' degree (1 major) Physics (2010)							
Bachelor' degree (1 major) Physics (2012)							
Master'	's degre	ee (1 major) Physics (20	11))			
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 21 / 296	



Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) FOKUS Physics (2011) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module	e title			Abbreviation	
Semico	onducto	or Lasers - Principles and	Current Research		11-HLF-092-m01
Module coordinator				Module offered by	
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	ind Astronomy
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
6	5 numerical grade				
Duratio	n	Module level	Other prerequisites		
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for			
Conten	ts				
model, hold co riers an des, las ductor cade la	which onditior od phot ser reso lasers, te	will then be extended to n, characteristic curve and ons. Other topics of the l onators, mode selection, The lecture closes with c erahertz lasers or high-pe	special aspects of se d laser efficiency are ecture are optical pro dynamic properties a urrent topics of laser erformance lasers.	miconductor lasers. derived from couple ocesses in semicond as well as technology research such as qu	Basic concepts such as thres- d rate equations for charge car- uctors, layer and ridge wavegui- y for the generation of semicon- iantum dot lasers, quantum cas-
Intende	ed learı	ning outcomes			
The stu knowle	dents l dge to	nave advanced knowledg modern questions and k	e of the principles of now the applications	semiconductor-lase in the current develo	er physics. They can apply their opment of components.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)	
R + V (n	o infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Methoo module is	d of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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					
Allocation of places					
Additional information					
Worklo	ad				

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

Referred to In LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Master's with 1 major FOKUS Physics (2011)

Module title					Abbreviation	
Principles of Energy Technologies					11-ENT-092-m01	
Module coordinator				Module offered by		
Manag	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for				
Conten	ts					
as rene ting ma studen verters Electric	wable aterials ts. Ener . Nucles tity. Bio	resources of energy. We a selective layers, highly a rgy conservation via thern ar power plants. Hydroele mass. Geothermal energ ning outcomes	also discuss aspects activated carbons). The mal insulation. Therm ectricity. Wind turbine y. Energy storage. Eng	of optimising materi ne course is especia odynamic energy ef es. Photovoltaics. So ergy transport	als (e.g. nanostructured insula- lly suitable for teaching degree ficiency. Fossil fired energy con- lar thermal: Heat. Solar thermal:	
The stu	dents l	now the principles of dif	ferent methods of en	ergy technology, esp	pecially energy conversion, trans-	
port an	d stora	ge. They understand the	structures of corresp	onding installations	and are able to compare them.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writt groups project (approx Assess and wil examin Langua	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.					
Allocation of places						
Additio	Additional information					
Worklo	Workload					
Teachi	Teaching cycle					

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Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Functional Materials (2012)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 26 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module	e title	Abbreviation					
Organi	Organic Semiconductor 11-OHL-092-m01						
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. con	Only after succ. compl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	i			
1 semester graduate		Admission prerequi 50% of exercises. C sion to assessment ve details at the beg be considered a dec students have obta over the course of the assessment into eff mitted to assessme assessment at a lat for admission to assessme	Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admis- sion to assessment. The lecturer will inform students about the respecti- ve 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 ad- mitted 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.				
Conten	ts						
Physica cations	al princ 5.	iples of organic semic	onductors, molecular a	nd polymer electroni	cs and sensor techn	ology, appli-	
Intende	ed lear	ning outcomes					
The stu	dents	have advanced knowle	edge of organic semicor	iductors.			
Course	S (type, r	number of weekly contact hou	rs, language — if other than Ge	rman)			
V + Ü (r	no infoi	rmation on SWS (week	ly contact hours) and co	ourse language avail	able)		
Method module is	d of ass s creditab	sessment (type, scope, lan le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	ion on whether	
a) writt groups project prox. 3	en exa (appro report o minu	mination (approx. 90 n x. 30 minutes per cand (approx. 10 pages, tim tes)	ninutes) or b) oral exam didate, for modules with e to complete: 1 to 4 we	nination of one candi h less than 4 ECTS cr eeks) or d) presentat	date each or oral exa edits approx. 20 mir ion/seminar presen	amination in 1utes) or c) tation (ap-	
Allocat	ion of _l	olaces					
Additio	onal inf	ormation					
Workload							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Technology of Functional Materials (2010) Master's with 1 major FOKUS Physics (2011) Master's with 1 major FOKUS Physics (2011)							
	data record Master (120 ECTS) FOKUS Physik - 2011						

Julius-Maximilians-UNIVERSITÄT WÜRZBURG



Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012)

Module	e title			Abbreviation			
Image	and Sig	gnal Processing in Phy	sics		11-BSV-122-m01		
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Conten	ts						
Periodi and im convolu getic ol transfo Intende The stu les of in	c and a age pro ution p bservat rmation ed learn idents mage p	periodic signals; princ ocessing; discretisation roduct; tapering functi- ion; statistical signals n. hing outcomes have advanced knowle rocessing and are fam	iples of discreet and ex n of signals/sampling th ons and interpolation o , image noise, moments dge of digital image an iliar with different meth	kact Fourier transform neorem (Shannon); h f images; the Parsiva s, stationary signals; d signal processing. ods of signal proces	nation; principles of nomogeneous and li al theorem, correlation tomography: Hanke They know the phys sing. They are able t	digital signal near filters, on and ener- ?l and Radon .ical princip- to explain dif-	
ferent r	nethod	s and to implement th	em, especially in the fie	eld of tomography.			
V + R (r	o infor	mation on SWS (week)	v contact hours) and co	urse language avail	ahle)		
Metho module is	d of ass s creditab	sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether	
a) writt (approx d) pres Assess and wil examin	a) written examination (90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2000						
Allocat	ion of _l	olaces					
Additional information							
Workload							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
			· · · · · · · · · · · · · · · · · · ·				
Master's w	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. Sik - 2011	page 29 / 296	



Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

Module	title		Abbreviation			
Ultrafas	st Spec	08-PCM4-PHY-111-m01				
Module	coord	inator		Module offered by		
lecturer of the seminar "Ultrakurzzeitspektroskopie and Quantenkontrolle"			oektroskopie and	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
This mo laser pu	odule d ulses, t	iscusses advanced topic ime-resolved laser spect	s in ultrafast spectro roscopy and coheren	scopy and quantum t control.	control. It focuses on ultrashort	
Intende	ed leari	ning outcomes				
Studen plain th principl	ts are a le theo les and	able to describe the gene ry of time-resolved laser l applications of quantun	ration of ultrashort la spectroscopy and na 1 control.	iser pulses and to ch me experimental me	aracterise them. They can ex- thods. They can describe the	
Courses	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)		
S + Ü (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Methoo module is	of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether	
written Langua	examiı ge of a	nation (90 minutes) or or ssessment: German or Ei	al examination of one	e candidate each (20	o minutes) or talk (30 minutes)	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master'	Master's degree (1 major) Physics (2010)					
Master's degree (1 major) Physics (2011)						
Master Master	s uegri s deor	ee (1 major) Nanostructul ee (1 major) Nanostructu	re Technology (2011)			
Master'	s degr	ee (1 major) FOKUS Phvsi	cs (2010)			
Master'	s degr	ee (1 major) FOKUS Physi	cs (2011)			

Module title					Abbreviation		
Princip	les of t	wo- and threedimension	onal Röntgen imaging	11-ZDR-111-m01			
Module coordinator				Module offered by			
Managing Director of the Institute of Ap		Applied Physics	pplied Physics Faculty of Physics and Astronomy				
ECTS Method of grading		Only after succ. con	Only after succ. compl. of module(s)				
6 numerical grade							
Duration Mo		Module level	Other prerequisites				
1 semester		graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Conten	Its						
 Physics of X-ray generation (X-ray tubes, synchrotron). Physics of the interaction between X-rays and matter (photon absorption, scattering), physics of X-ray detection. Mathematics of reconstruction algorithms (filtered rear projection, Fourier reconstruction, iterative methods). Image processing (image data pre-processing, feature extraction, visualisation,). Applications of X-ray imaging in the industrial sector (component testing, material characterisation, metrology, biology,). Radiation protection and biological radiation effect (dose,). Intended learning outcomes The students know the principles of generating X-rays and of their interactions with matter. They know imaging techniques using X-rays and methods of image processing as well as application areas of these methods. Courses (type, number of weekly contact hours, language – if other than German) V + R (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) 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. 							
(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.							
Workland							
Teaching cycle							
Referred to in LPO L (examination regulations for teaching-degree programmes)							
Master's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. reg. pag data record Master (120 ECTS) FOKUS Physik - 2011 Description Description				page 32 / 296			

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012) Master's degree (1 major) FOKUS Physics (2012) Master's degree (1 major) FOKUS Physics (2006)

Module title					Abbreviation	
Quantum Information Technology					11-QUI-132-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Ap		plied Physics Faculty of Physics and Astronomy				
ECTS	ECTS Method of grading		Only after succ. compl. of module(s)			
6	nume	rical grade	····			
Duration		Module level	Other prerequisites			
1 semester graduate		graduate				
Conten	ts					
Basic concepts of quantum mechanics, quantum bits and algorithms, quantal measurements, experimental approaches towards quantum computing (on the basis of photons, ions and nuclear spins), quantum operations and quantum noise, quantum information and communication.					neasurements, experimental ap- ar spins), quantum operations	
Intende	ed leari	ning outcomes				
The students are familiar with the basic quantum mechanical terms of quantum information technology. They know experimental approaches for the realisation of quantum computers and for the transfer of quantum information.						
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
 Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English 						
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010)						
Master's degree (1 major) FOKUS Physics (2010)						
Master's degree (1 major) FOKUS Physics (2011)						

Module title					Abbreviation	
Current Topics of Experimental Physics					11-EXE6A-112-m01	
Module coordinator				Module offered by		
chairperson of examination committee				Faculty of Physics and Astronomy		
ECTS	ECTS Method of grading Only after suc			. compl. of module(s)		
6 numerical grade						
Duration Module level		Other prerequisites				
1 semester graduate		Approval by examination committee required.				
Conten	Contents					
Current topics of Experimental Physics. Accredited academic achievements, e.g. in case of change of university or study abroad.						
Intende	ed learr	ning outcomes				
The students have advanced competencies corresponding to the requirements of a module of Experimental Phy- sics of the Master's programme. They have knowledge of a current subdiscipline of Experimental Physics and un- derstand the measuring and/or evaluation methods necessary to acquire this knowledge. They are able to classi- fy the subject-specific contexts and know the application areas.						
V + R (no information on SWS (weekly contact hours) and course language available)						
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)						
a) written examination (approx. 120 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) Language of assessment: German, English						
Allocation of places						
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Physics (2011) Master's degree (1 major) EQKUS Physics (2011)						
master's degree (1 major) FUKUS Physics (2011)						

Module title					Abbreviation	
Current Topics in Physics					11-EXP6-111-m01	
Module coordinator				Module offered by		
chairperson of examination committee				Faculty of Physics a	nd Astronomy	
ECTS Method of grading Only after succ. co			Only after succ. com	npl. of module(s)		
6 numerical grade						
Duration		Module level	Other prerequisites			
1 semester graduate		graduate	Approval by examination committee required.			
Conten	ts					
Current topics of Experimental and Theoretical Physics. Accredited academic achievements, e.g. in case of change of university or study abroad.						
Intende	ed leari	ning outcomes				
The students have advanced competencies corresponding to the requirements of a module of Experimental or Theoretical Physics of the Master's programme of Nanostructure Technology. They have knowledge of a current subdiscipline of Physics and understand the measuring and/or calculation methods necessary to acquire this knowledge. They are able to classify the subject-specific contexts and know the application areas.						
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)						
a) written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; un- less otherwise specified) 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 (ap- prox. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minu- tes) Language of assessment: German, English						
Allocation of places						
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)						


Solid State Physics and Nanostructures (Experiment)

(ECTS credits)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 37 / 296
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Module	e title				Abbreviation	
Semiconductor Physics and Devices					11-SPD-102-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Applied Physics			oplied Physics	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)	,	
6	nume	rical grade		•		
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for				
Conten	ts	<u> </u>				
Princip as of el	les of S ectroni	Semiconductor Physics. In ics and photonics.	ntroduction to key the	eories on semicondu	ictors. Components from the are-	
Intende	ed lear	ning outcomes				
and ph perties equatic on and basic u nents o and Gu ser). Th ductors ents.	The students are familiar with the properties of semiconductors, they have gained an overview of the electronic and phononic band structures of important semiconductors and the resulting electronic, optical and thermal pro- perties. They know the principles of charge transport and are able to apply Poisson, Boltzmann and continuity equations to the solution of questions. They have gained insights into the methods of semiconductor producti- on and are familiar with the methods of planar technology and current developments in this sector, they have a basic understanding of component production. They understand the structure and function of the main compo- nents of electronics (diodes, transistor, FET, thyristor, diac, triac), microwave applications (tunnel, impatt, baritt and Gunn diode) and optoelectronics (photo diode, solar cell, light-emitting diode, semiconductor injection la- ser). They know the realisation possibilities of low-dimensional charge carrier systems on the basis of semicon- ductors and their technological importance. They are familiar with current developments in the field of compon-					
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Gei	man)		
V + R (n	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	sessment (type, scope, langua ele for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
written examination (approx. 90 minutes) or 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 pro- ject report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or 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						
Allocation of places						
Additio	nal inf	ormation				

Workload

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012) Master's degree (1 major) Functional Materials (2012)

Module title					Abbreviation	
Solid State Physics 2 11-FK2-092-m01					11-FK2-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Ap			pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	S Method of grading Only after succ. compl. of module(s)					
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Conten	ts					
Advano cal mo citatior	ed Soli del. Die s and o	id-State Physics. Electro electric properties and fe optical properties [optio	ns in periodic potentia rroelectrics. Semicon nal]	al - the band structur ductors. Magnetism.	re. Dynamics in the semi-classi- Superconductivity. Coupled ex-	
Intend	ed learı	ning outcomes				
The stu le to sp	idents l pecialis	nave specific and advan e in a sub-discipline of S	ced knowledge in the Solid-State Physics.	field of Solid-State F	Physics. They are theoretically ab-	
Course	S (type, n	umber of weekly contact hours,	language — if other than Ger	rman)		
R + V (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
Metho module is	d of ass s creditab	s essment (type, scope, langu le for bonus)	age — if other than German, o	examination offered — if no	t every semester, information on whether	
a) writt groups project (approz Assess and wil examin	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.					
Allocat	ion of r	blaces	5			
Additio	onal info	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's w	aster's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Master (120 FCTS) FOKUS Physik - 2011					
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Pachalar' dagrae (1 major) Dhurics (2010)
Bachelor degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)

Module title					Abbreviation		
Solid State Spectroscopy					11-FKS-092-m01		
Module coordinator				Module offered by			
Managing Director of the Institute of Ap			Applied Physics	plied Physics Faculty of Physics and Astronomy			
ECTS Method of grading			Only after succ. con	Only after succ. compl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtaine the course of the se sessment into effec ted to assessment i sessment at a later admission to asses	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Conten	ts						
Single- spectro	and m scopy.	any-particle picture of X-ray spectroscopies.	electrons in solids. Ligl	nt-matter interaction.	. Optical spectrosco	py. Electron	
Intende	ed lear	ning outcomes					
The stu types o develor	idents l if spect pments	nave specific and adva roscopy and their field in research.	nced knowledge in the s of application. They u	field of solid-state s inderstand the theor	pectroscopy. They k etical principles and	now different I the current	
Course	S (type, r	umber of weekly contact hour	rs, language — if other than Ge	rman)			
R + V (n	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)		
Methoo module is	d of ass creditab	s essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	it every semester, informat	ion on whether	
a) writt groups project (approx Assess and wil examin Langua	en exai (appro report x. 30 m ment o Il be an ation r	nination (approx. 90 n x. 30 minutes per cano (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form u egulations) 2009.	ninutes) or b) oral exam didate, for modules with , time to complete: 1 to often assessment will under observance of Se	nination of one candi h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection	date each or oral ex edits approx. 20 mir entation/seminar pre on the method of ase 3 ASPO (general aca	amination in nutes) or c) esentation sessment demic and	
Allocat	ion of r	olaces					
Additio	nal inf	ormation					
Workload							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master's wi	aster's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. reg. page 42 / 296 data record Master (120 ECTS) FOKUS Physik - 2011						

Module	Module title Abbreviation					
Semiconductor Lasers - Principles and Current Research					11-HLF-092-m01	
Module coordinator				Module offered by		
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anow.				
Conten	ts					
nent de model, hold co riers an des, las ductor cade la	which which onditior od phot ser reso lasers. sers, te	will then be extended to n, characteristic curve and ons. Other topics of the l onators, mode selection, The lecture closes with c erahertz lasers or high-pe	special aspects of se d laser efficiency are ecture are optical pro dynamic properties a urrent topics of laser erformance lasers.	miconductor lasers. derived from couple ocesses in semicond is well as technology research such as qu	a on the basis of a general laser Basic concepts such as thres- d rate equations for charge car- uctors, layer and ridge wavegui- / for the generation of semicon- lantum dot lasers, quantum cas-	
Intende	ed learı	ning outcomes				
The stu knowle	dents l dge to	nave advanced knowledg modern questions and k	e of the principles of now the applications	semiconductor-lase in the current develo	er physics. They can apply their opment of components.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (n	no infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	d of ass s creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
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						
Allocat	Allocation of places					
Additional information						
Worklo	ad					

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Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Module title					Abbreviation	
Semiconductor Physics					11-HLP-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Ap			Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS Method of grading			Only after succ. compl. of module(s)			
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisite sessment. The lectur at the beginning of the sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts		•			
Advanc ons and sation e	ed exa d their effects	mination of crystal bon coupling effects. Electr of semiconductors with	ding and the electronic on-phonon coupling. To reduced dimensions.	c band structure of s emperature-depende (Semi-)magnetic ser	emiconductors. Opti ent transport propert niconductors.	cal excitati- ies. Quanti-
Intende	ed leari	ning outcomes				
The stu cal prin materia	dents ciples Ils.	nave specific and adva of semiconductors and	nced knowledge in the have gained an overvi	field of Semiconduc ew of the important	tor Physics. They kno characteristics of se	ow the physi- miconductor
Course	S (type, n	umber of weekly contact hour	s, language — if other than Gei	rman)		
R + V (n	o infor	mation on SWS (weekly	y contact hours) and co	ourse language availa	able)	
Methoo module is	l of ass creditab	s essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
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.						
Allocat	ion of p	olaces				
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wi	th 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Naster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 46 / 296





Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012)

Module	Module title				Abbreviation	
Semiconductor Nanostructures					11-HNS-092-m01	
Module coordinator				Module offered by		
Manag	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anow.				
Conten	ts					
or maci ging the tures o with a f of nove for qua	roscopi eir size f varyin focus o el optoe ntum c	or nanostructures are free c crystals, their electroni . The lecture addresses t g dimensions (2D, 1D, of n optical properties and electronic and quantum p ommunication and quan	c, optical and magne echnological challen). It provides the bas light-matter coupling hotonic devices base tum computing archim	tic properties can be ges in the preparation sic theoretical conce Moreover, it discus ed on such nanostru- tectures.	. In contrast to atoms, molecules e systematically tailored by chan- on of semiconductor nanostruc- pts to describe their properties, ses the challenges and concepts ctures, including building blocks	
Intende	ed learı	ning outcomes				
The stu knowle devices	idents l dge of s. They	know the theoretical prin the technological metho are able to apply their kr	ciples and characteri ds to fabricate such s lowledge to problems	stics of semiconduct tructures, and of the in this field of resea	tor nanostructures. They have ir applications to novel photonic arch.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Method module is	d of ass s creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
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 Allocation of places						
Additio	Additional information					
Worklo	Workload					

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Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Technology of Functional Materials (2010)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Module title Abbreviation						
Magnetism					11-MAG-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Ap			pplied Physics	plied Physics Faculty of Physics and Astronomy		
ECTS I	Metho	d of grading	Only after succ. con	npl. of module(s)		
6 r	numer	ical grade				
Duration	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Contents	s					
Dia- and ture, nan fect.	paran 10mag	nagnetism, exchange in netism, superparamagi	teraction, ferromagne netism, experimental I	tism, antiferromagne methods to measure	etism, anisotropy, do magnetic properties	omain struc- 5, Kondo ef-
Intended	d learn	ing outcomes				
experime ches anc on proble Courses R + V (no Method	ents; t d are a ems o (type, n o inform of ass	hey are skilled in simpl ble to apply them to tas f these areas; they are a umber of weekly contact hours, mation on SWS (weekly essment (type, scope, langu	e model building and sks in the stated areas able to evaluate the ad language — if other than Gen contact hours) and co age — if other than German,	in the formulation of s; they have compete ccuracy of observation (man) ourse language availation examination offered — if no	able)	ical approa- ntly working
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.						
Allocatio	on of p	laces				
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's with	1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 50 / 296



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 51 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title				Abbreviation	
Nanoanalytics					11-NAN-092-m01
Module coordinator				Module offered by	
Managi	ng Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semestergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective of at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. If set dents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration for setsment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. F sessment at a later date, students will have to obtain the qualification			alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for		
Conten	ts				
 Principles of analytic procedures in the field of nanostructure physics, imaging techniques from a microscopic level up to an atomic level, examination of chemical composition, spectroscopy of electronic properties, usage of X-ray methods Physics and material systems on the nanoscale Scanning probes: Atomic force microscopy. Scanning tunneling microscopy Electron probes: Scanning electron microscope. Transmission electron microscope Secondary ions - mass spectrometry - X-ray methods: Synchrotron spectroscopy. Photoemission. X-ray absorption Intended learning outcomes The students have basic knowledge of modern research methods for different nanostructures up to an atomic level. They know microscoping procedures that are used in practice in labs and the industry as well as spectroscopic methods for the determination of electronic properties. They are able to evaluate the efficiency of different research methods. Courses (type, number of weekly contact hours, language – if other than German) R + V (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 20 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 Allocation of places					
Additional information					
Worklo	ad				

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Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Functional Materials (2012)

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Module	e title				Abbreviation
Low-Di	mensio	onal Structures			11-NDS-092-m01
Module	e coord	inator		Module offered by	
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
4	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective de at the beginning of the course. Registration for the course will be c sidered a declaration of will to seek admission to assessment. If st dents have obtained the qualification for admission to assessmen the course of the semester, the lecturer will put their registration for sessment into effect. Students who meet all prerequisites will be a ted to assessment in the current or in the subsequent semester. For sessment at a later date, students will have to obtain the qualifica		
Conton	tc	<u> </u>		inent anew.	
ContentsLow-dimensional structures: Crystal lattice symmetry. Lattice dynamics and growth techniques of low-dimensional structures. Comparison between these structures and volume solids. X-ray diffractometry. Molecular beam epitaxy.Intended learning outcomesThe students have knowledge of the theoretical principles of the growth of low dimensional structures. They know methods of producing and analysing such structures. They know the bandstructures of the most important semiconductors as well as the fabrication and characteristics of semiconductor heterostructures and MOS-diodes. They are familiar with the subband structure of semiconductor heterostructures and MOS-diodes and can evaluate the importance of many-particle effects. They are able to solve problems related to potentials in one dimension by applying Poisson's equation. They know the k*p perturbation theory and can deduce the 2D subband structure from the bulk band structure. They have knowledge of the meaning of modulation doping and are familiar with the 2D hydrogen atom. They understand how an external magnetic field acts on the properties of a free electron gas in 2D. They have basic knowledge of the meaning of gauging, Landau-quantisation, filling factor, and are able to solve implicit problems via numerical methods. They are familiar with elementary excitations in					
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)	
R + V (n	io infor	mation on SWS (weekly o	contact hours) and co	urse language avail	able)
Methoo module is	d of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
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					
Allocat	ion of _l	olaces			

Additional information

Master's with	1 major FOKUS Physics (2011)	

Workload

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

Module title			Abbreviation			
Quantu	Quantum Transport in Semiconductor Nanostructures			11-QTH-102-m01		
Module	coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective of at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. If se dents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration for sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. F sessment at a later date, students will have to obtain the qualifica- admission to assessment anew.			as- tive details Il be con- nt. If stu- ssment over tion for as- til be admit- ster. For as- alification for			
Conten	ts					
The lect topics of phenon transpo	ture ad of: balli nena b ort phei	dresses the fundamen istic and diffuse transp etween electrons, Coul nomena, topological in	tal transport phenomer ort, electron interferen omb blockade, thermo sulators, solid-state qu	na of electrons in na ce effects, quantisat electric properties, c iantum computers.	nostructures. This in ion of conductivity, i lescription of spin-d	cludes the nteraction ependent
Intende	ed learı	ning outcomes				
The stu ons and	dents l d appli	nave mastered the bas cations of respective co	ics of electronics of nar omponents.	nostructures in theor	y and practice. They	know functi-
Courses	S (type, n	umber of weekly contact hour	s, language — if other than Gei	rman)		
V + R (n	o infor	mation on SWS (weekl	y contact hours) and co	ourse language availa	able)	
Methoo module is	l of ass creditab	s essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
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.						
Allocat	ion of p	olaces	<u> </u>			
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wi	tn 1 majoi	TFUKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Naster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 56 / 296

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2011) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Nanostructure Technology (2011)

Master's degree (1 major) FOKUS Physics (2011)

Master's degree (1 major) Functional Materials (2012)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 57 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title			Abbreviation			
Nano-O	Nano-Optics				11-NOP-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Applied Physic			Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective detai at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment ov the course of the semester, the lecturer will put their registration for as sessment into effect. Students who meet all prerequisites will be adm ted to assessment in the current or in the subsequent semester. For as sessment at a later date, students will have to obtain the qualification admission to assessment anew.			as- tive details ll be con- nt. If stu- sment over tion for as- ill be admit- ster. For as- alification for	
Conten	ts					
Theoret quantu	tical pr m emit	inciples. Focussing of l ters. Light emission in	ight. Microscopy. Optic nano-tailored environn	al nearfield probes. nents. Plasmons. Op	Nearfield microscop [.] tical antennas.	y. Single
Intende	ed lear	ning outcomes				
The stu retical p	dents l princip	have specific and adva les and application are	nced knowledge in the as of nano-optics and	field of nano-optics. with current develop	They are familiar wi ments in this field.	th the theo-
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
R + V (n	io infor	mation on SWS (weekl	y contact hours) and co	ourse language availa	able)	
Methoo module is	d of ass creditab	sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether
a) writte groups project (approx Assess and wil examin Langua	en exai (appro report k. 30 m ment o l be an ation r ge of a	mination (approx. 90 n x. 30 minutes per cand (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form u egulations) 2009. ssessment: German, E	ninutes) or b) oral exam lidate, for modules with , time to complete: 1 to often assessment will l nder observance of Sen nglish	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection	date each or oral exa edits approx. 20 min entation/seminar pre on the method of ass 3 ASPO (general aca	amination in iutes) or c) esentation sessment demic and
Allocat	ion of p	olaces				
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Bachel	or' deg	ree (1 major) Physics (2	2010)			
Master's wi	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data_record M	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 58 / 296

Julius-Maximilians-UNIVERSITÄT WÜRZBURG



Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

Module title				Abbreviation		
Quantum Phenomena in electronic correlated Materials			11-QPM-092-m01			
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 semestergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective of at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. If dents have obtained the qualification for admission to assessme the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. I sessment at a later date, students will have to obtain the qualific admission to assessment anew.) as- :tive details Il be con- nt. If stu- ssment over ition for as- ill be admit- ster. For as- alification for			
Conten	ts					
Quantu Strongl	ım effe y corre	cts and phenomena in lated systems	current solid-state rese	earch. Correlations. F	ree electron gas and	Fermi liquid.
Intende	ed lear	ning outcomes				
The stu quantu retical	idents l m effeo descrip	have specific, advance cts in strongly correlate ttion of such systems a	d knowledge of the cur ed systems. They are ab nd the current experim	rent research on Soli de to understand the ental results.	d-State Physics, esp connections betwee	ecially on en the theo-
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
R + V (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Method module is	d of ass creditab	sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether
a) writt groups project (approx Assess and wil examin Langua	en exai (appro report x. 30 m ment o ll be an action r age of a	mination (approx. 90 n x. 30 minutes per cano (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form u egulations) 2009. ssessment: German, E	ninutes) or b) oral exam lidate, for modules with , time to complete: 1 to often assessment will l nder observance of Sen nglish	nination of one candi h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection	date each or oral exa edits approx. 20 mir entation/seminar pre on the method of ase 3 ASPO (general aca	amination in iutes) or c) esentation sessment demic and
Allocat	ion of p	olaces	<u> </u>			
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Peferred to in LPO L (memination completions for the chine descent energy and the second seco						
Module appears in						
Master's wi	ith 1 majo	r fukus Physics (2011)	JMU Würzburg data record M	s • generated 26-Aug-2024 • 6 Naster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 60 / 296



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

Module title				Abbreviation		
Spintro	onics				11-SPI-102-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 semester graduate Certain prerequisites must be met to qualify for admission to a sessment. The lecturer will inform students about the respecti at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assessment dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registrati sessment into effect. Students who meet all prerequisites will ted to assessment at a later date, students will have to obtain the qualification for admission to assess a sessment at a later date, students will have to obtain the qualification for the semester.		o as- ctive details ill be con- nt. If stu- ssment over ation for as- 'ill be admit- ster. For as- ialification for				
Conten	Its		·			
This lea magne spin dy Intendo	cture co toresis mamics ed lear	overs the basic principl tance and tunnel magr s and current-induced s ning outcomes	les of spin transport, wi letoresistance. As a las spin phenomena.	th a particular emph t point, we discuss n	asis on the phenom ww phenomena fron	ena of giant n the field of
The stu	Idents	know the basic princip	les of spin transport mo	odels and the application	ations of spin transp	ort in infor-
mation nel ma	techno gnetore	ology. They have gaine esistance).	d an overview of curren	t findings in this field	d (giant magnetores	istance, tun-
Course	S (type, r	number of weekly contact hour	rs, language — if other than Ge	rman)		
V + R (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Metho module is	d of ass s creditab	essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
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.						
Allocat	ion of _l	olaces				
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's w	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record A	• generated 26-Aug-2024 • 6 Aaster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 62 / 296



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2010)

Module title				Abbreviation		
Methods in Surface Spectroscopy			11-MSS-102-m01			
Module	e coord	inator		Module offered by		
Managi	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme:	ster	graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification admission to assessment anew.			as- tive details ill be con- nt. If stu- ssment over tion for as- ill be admit- ster. For as- alification for
Conten	ts					
Bounda les of p shape, radiatio	ary con hotoel satellit on, rela	ditions of experiments ectron spectroscopy (P æs, Fermi liquid, quasi ted experimental meth	Ultra-high vacuum, su ES), one-particle image particles, exemplary sy ods.	rface sensibility, ligh of PES, three step n stems and spectra, r	nt-matter-interaction nodel, many-particle neasurements with s	, princip- effects, line synchrotron
Intende	ed leari	ning outcomes				
The stu conduc	dents l t, evalı	know the physical prine uate and interpret simp	iples and experimenta le measurements.	l methods of surface	e spectroscopy. They	are able to
Course	S (type, r	umber of weekly contact hour	s, language — if other than Gei	rman)		
V (no ir	Iformat	ion on SWS (weekly co	ntact hours) and cours	e language available	2)	
Methoo module is	d of ass creditab	s essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
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.						
Allocation of places						
Additional information						
Workload						
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Master's wi	th 1 majo	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Naster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 64 / 296

Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module title				Abbreviation		
Introdu	iction t	o Electron Microscopy			11-IEM-111-m01	
Module	Module coordinator			Module offered by	· · · · · · · · · · · · · · · · · · ·	
Managi	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective deta at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment of the course of the semester, the lecturer will put their registration for a sessment into effect. Students who meet all prerequisites will be adm ted to assessment in the current or in the subsequent semester. For a sessment at a later date, students will have to obtain the qualification			
Conten	ts					
(selecte on tech formati image f 7. Chen spectro	ed-area inique) on, ima formati nical ar oscopy)	ED, convergent beam ED, convergent beam ED, 4. Transmission electron aging of microstructure). on, image simulation). 6. nalysis with the electron . 8. Sample preparation.	D, basics of electron on microscopy (the ins 5. Can we see atoms? Scanning electron m microscope (energy-d Electron microscopy	rystallography, com trument, contrast m High-resolution ele icroscopy (the instru lispersive X-ray micr and complementary	parison with the X-ray diffracti- echanisms, principles of image ctron microscopy (principle of ument, contrast mechanisms). oanalysis, electron energy loss techniques.	
Intende	ed learı	ning outcomes				
The stu They kr copic m	dents l now mic nethod	nave basic knowledge of croscoping procedures th s for chemical analysis. T	modern research me hat are used in praction hey are able to evalu	thods of electron mi ce in labs and the ind ate the efficiency of	croscopy up to an atomic level. dustry as well as electron-micros- different research methods.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	no infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	d of ass s creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
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						
Allocat	ion of p	olaces				
Additio	Additional information					
Worklo	ad					

Referred to in LPO I (examination regulations for teaching-degree programmes)

Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Bachelor' degree (1 major) Physics (2010)					
Bachelor' degree (1 major) Physics (2012)					
Bachelor' degree (1 major) Nanostructure Technology (2010)					
Bachelor' degree (1 major) Nanostructure Technology (2012)					
Master's degree (1 major) Physics (2010)					
Master's degree (1 major) Physics (2011)					
Master's degree (1 major) Nanostructure Technology (2011)					
Master's degree (1 major) Nanostructure Technology (2010)					
Master's degree (1 major) FOKUS Physics (2010)					
Master's degree (1 major) FOKUS Physics (2011)					
Master's degree (1 major) Functional Materials (2012)					
Master's degree (1 major) FOKUS Physics (2006)					

Module title					Abbreviation		
Solid State Spectroscopy 2 11-FKS2-132-m01							
Module coordinator				Module offered by			
Managing Director of the Institute of Ar			Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS Method of grading			Only after succ. con	Only after succ. compl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites	;			
1 seme	ster	graduate					
Conten	Contents						
Modern scattering methods; neutron scattering as a method to investigate the atomic and magnetic structure and excitations such as phonons and magnetic waves; resonant elastic X-ray scattering and absorption; investi- gation of magnetic, orbital and charge order; X-ray and neutron reflectometry; investigation of the structural, ma- gnetic and electronic properties of thin films and superlattices; resonant inelastic X-ray scattering; investigation of excitations in solids and thin films; STEM ("scanning transmission electron microscopy"); further topics upon agreement.							
Intende	ed learı	ning outcomes					
The stu tering, are fam	ıdents l moderr niliar wi	know different modern n scattering theory, X-ra th the theoretical princ	scattering methods su y and neutron reflecto iples and applications	ch as neutron scatte metry and resonant i of these methods.	ring, resonant elasti inelastic X-ray scatte	c X-ray scat- ring. They	
Course	S (type, n	umber of weekly contact hour	s, language — if other than Ge	rman)			
V + R (r	10 infor	mation on SWS (weekl	/ contact hours) and co	ourse language avail	able)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)							
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each of oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English							
Allocat	tion of p	olaces					
Additional information							
Worklo	ad						
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)							
Master's w	Aaster's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. reg. page 68 / 29				page 68 / 296		
			data record M	Master (120 ECTS) FOKUS Phys	sik - 2011		

Module title					Abbreviation		
Physics of Advanced Materials 11-PMM-132-mo1							
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Meth	od of grading	Only after succ. con	Only after succ compl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
	stor	graduate					
Conton	te	Siduate					
Conten	1					ia mataviala	
and su groups	percon ; two-d	ductors; thin films, het imensional layer mater	erostructures and supe ials.	erlattices. Methods o	f characterising thes	e material	
Intende	ed lear	ning outcomes					
The stu	idents	know the properties an	d characterising metho	ds of some modern	materials.		
Course	S (type, r	umber of weekly contact hour	 5. language — if other than Ge	rman)			
V + R (r	no infor	mation on SWS (weekly	v contact hours) and co	urse language avail	able)		
Metho	d of as		uago — if other than German	ovamination offered - if no	t ovory comostor informat	ion on whothor	
module is	s creditab	le for bonus)	uage – Il other than German,	examination onered — If no	n every semester, monnat	on on whether	
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.							
Allocation of places							
Additio	nal inf	ormation					
Additio	nat ini						
Workload							
Teachi	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Bachelor' degree (1 major) Physics (2010)							
Bachelor' degree (1 major) Physics (2012)							
Bachelor' degree (1 major) Nanostructure Technology (2010)							
Bachelor' degree (1 major) Nanostructure Technology (2012)							
Master's degree (1 major) Physics (2010)							
Master's degree (1 major) Physics (2011)							
Master	's degr	ee (1 major) Nanostruct	ure Technology (2011)				
Master	's degr	ee (1 major) Nanostruct	ure Technology (2010)				
Master	's degr	ee (1 major) FOKUS Phy	SICS (2010)				
waster	s degr	ee (1 major) FUKUS Phy	SICS (2011)				
Master's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26- data record Master (120 ECTS)			• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 69 / 296		

Module title					Abbreviation	
Current Topics in Physics					11-EXP6-111-m01	
Module coordinator				Module offered by		
chairpe	erson of	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS Method of grading			Only after succ. com	Only after succ. compl. of module(s)		
6	nume	rical grade				
Duration		Module level	Other prerequisites	,		
1 semester graduate Approval by examin				ation committee required.		
Conten	ts					
Current change	topics of univ	of Experimental and The versity or study abroad.	oretical Physics. Accr	edited academic acl	hievements, e.g. in case of	
Intende	ed learr	ning outcomes				
The students have advanced competencies corresponding to the requirements of a module of Experimental or Theoretical Physics of the Master's programme of Nanostructure Technology. They have knowledge of a current subdiscipline of Physics and understand the measuring and/or calculation methods necessary to acquire this knowledge. They are able to classify the subject-specific contexts and know the application areas.						
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	d of ass creditab	s essment (type, scope, langua ₎ le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; un- less otherwise specified) 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 (ap- prox. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minu- tes) Language of assessment: German, English						
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)						

Module title					Abbreviation	
Current	Topics	s of Experimental Physics		11-EXE6A-112-m01		
Module coordinator				Module offered by		
chairperson of examination committee				Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duration Module level		Other prerequisites				
1 semester graduate		graduate	Approval by examination committee required.			
Conten	ts					
Current or study	topics y abroa	of Experimental Physics. Id.	Accredited academi	c achievements, e.g.	in case of change of university	
Intende	ed learr	ning outcomes				
The students have advanced competencies corresponding to the requirements of a module of Experimental Phy- sics of the Master's programme. They have knowledge of a current subdiscipline of Experimental Physics and un- derstand the measuring and/or evaluation methods necessary to acquire this knowledge. They are able to classi- fy the subject-specific contexts and know the application areas.						
$V \pm P$ (n	o infor	mation on SWS (weekly contact hours, t	contact hours) and co	urse language avail:	able)	
Method	d of acc		go if other than Corman .c	variation offered - if no	t over comester information on whether	
module is	creditab	le for bonus)			tevery semester, mornation on whether	
a) written examination (approx. 120 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) Language of assessment: German, English						
Allocat	ion of p	olaces				
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Physics (2011)						
master's degree (1 major) FUKUS Physics (2011)						



FOKUS Physics

Astrophysics and Particle Physics (Experiment)

(ECTS credits)
Module title A					Abbreviation	
Experin	nental	Particle Physics			11-TPE-092-m01	
Module	coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester g		graduate	Certain prerequisite sessment. The lectur at the beginning of sidered a declaration dents have obtained the course of the se sessment into effect ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo admission to assessment anew.		
Conten	ts					
Physics supersy as well of syste	with n mmetr as oth ematic	nodern particle detectory and other physics be er parameters of the st errors.	ers at the LHC and at the eyond the standard mod andard model. Introduc	e Tevatron. Discover del. Determination o ction to modern metl	y of the Higgs boson f the top quark mass nods of analysis and	. Search for and W mass assessment
Intende	ed learı	ning outcomes				
The stu questio lysis an	dents a ons of P od are a	are familiar with the pri Particle Physics, which able to put results into	nciples of modern part are examined by using context and to assess t	icle detector physics these detectors. The heir systematic unce	s, especially with cur y know modern met ertainties.	rently open hods of ana-
Courses	S (type, n	umber of weekly contact hour	s, language — if other than Ger	rman)		
R + V (n		mation on SWS (weeki	y contact hours) and co	ourse language avail	able)	
module is	creditab	le for bonus)	uage — if other than German,	examination offered — if no	it every semester, informati	on on whether
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.						
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 73 / 296



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 74 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title Abbreviation							
Strong	Strong Interaction in Accelerator Experiments				11-WWB-102-m01		
Module coordinator				Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	ind Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
3	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester		graduate	Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	Its						
Asymp mena. collisio	tomatio QCD Je ons.	t freedom/confinemen t simulation. Hadron p	t. Hadron production in roduction in electron-pr	e+/e- collisions. QC roton collisions. Had	D coherence/interfe ron production in pr	erence pheno- roton-proton	
Intend	ed lear	ning outcomes					
The stu perime to appl	idents nts. Th y them	know the basic organis ey have knowledge of i •	ation of QCD processes methods of data analys	s. They are able to in is, understand the u	terpret results of acc nderlying theories a	celerator ex- Ind are able	
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)			
V + R (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)		
Metho module is	d of ass s creditab	Sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether	
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.						amination in nutes) or c) esentation sessment idemic and	
Allocat	ion of _l	olaces					
Additio	onal inf	ormation					
Worklo	ad						
Teachi	Teaching cycle						
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)			
Master's w	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record A	• generated 26-Aug-2024 • 6 Aaster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 75 / 296	



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 76 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module	title				Abbreviation	
Astrophysics					11-A4-072-m01	
Module	e coord	inator		Module offered by		
Managi and Ast	ing Dire trophys	ector of the Institute of T sics	heoretical Physics	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester undergraduate		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				
Conten	tc					
pes and stellar i large-so nucleos Intende The stu physica ons. Th lopmen	d detec mediur cale str synthes ed learn dents a dents a al obse ey kno it.	tors, stellar structure, s n, structure of the Milky ructure of the universe, l sis, cosmic microwave b ning outcomes are familiar with the mo rvations and evaluation w the structure of the un	tellar atmospheres, st Way, local universe, e Friedmann World Mod background radiation, dern world view of Ast s. They are able to use niverse, e.g. of stars an	ellar evolution, final expanding space-tim els, thermodynamics structure formation, rophysics. They know e these methods to p nd galaxies and unde	stages of stellar evo e, galaxies, active ga s of the early univers inflation w methods and tools alan and analyse own erstand the process	lution, inter- alactic nuclei, e, primordial s for astro- n observati- of their deve-
Course	S (type, r	number of weekly contact hours	, language — if other than Ge	rman)		
V + S (n	io infoi	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	sessment (type, scope, langu le for bonus)	uage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
written	exami	nation (approx. 120 min	utes)			
Allocat	ion of _l	olaces				
Only as	part o	f pool of general key ski	ills (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Additio	nal inf	ormation				
Worklo	ad					
 Taashir		-	_			
Teachir	ig cyci	e	_			
Poferred to in LDO L (
Module appears in						
Bachel	or' deg	ree (1 major) Physics (20	007)			
Master's wi	th 1 majo	r FOKUS Physics (2011)	JMU Würzburg	• generated 26-Aug-2024 • 6	exam. reg.	page 77 / 296





Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title					Abbreviation	
Practica	al Cour	se Astrophysics			11-APP-111-m01	
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of T sics	heoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anow.				
Conten	ts		•			
Astroph tions.	nysical	experiments in the field	s of detectors, telesco	opes, methodology, a	analysis and astronon	nic observa-
Intende	ed learı	ning outcomes				
The stu measur and wit ons and	dents l ing dat h basio d meas	nave mastered experime ta and present the result t techniques of detecting urements and to presen	ntal methods of Astro s. They are familiar w g electromagnetic rad t the results.	ophysics and are able ith the working meth iation. They are able	e to analyse and inter ods of observational to plan and evaluate	pret the Astronomy observati-
Courses	S (type, n	umber of weekly contact hours,	language — if other than Ger	rman)	<u></u>	
P (no in	tormat	ion on SWS (weekly con	tact hours) and cours	e language available	2)	
Method module is	creditab	s essment (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	t every semester, information	n on whether
a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. Experiments that were not successfully completed can be repeated once. Or b) discussion to test the candidate's understanding of the physics-related contents and results of the experiment (approx. 20 mi- nutes). 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						f a Testat cussion to prox. 20 mi- essment emic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wi	th 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 79 / 296



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 80 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title					Abbreviation
Introduction to Space Physics					11-ASP-092-m01
Module	coord	inator		Module offered by	
Managi and Ast	ng Dire trophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew		
Conten	ts				
1. Overv 2. Dyna 3. Elem 4. The s 5. Accel 6. Instru Intende The stu chargeo measur	view mics of ents of leration uments ed learn dents l d partic ring me	f charged particles in r space physics d heliosphere n and transport of ener to measure energetic ning outcomes nave basic knowledge tles in space and in the thods.	nagnetic and electric fie getic particles in the he particles in extraterrest of Space Physics, in pa e heliosphere. They kno	elds eliosphere trial space rticular of the charac w relevant paramete	terisation of the dynamics of ers, theoretical concepts and
Courses	S (type, n	umber of weekly contact hour	s, language — if other than Ger	rman)	
R + V (n	o infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)
Method module is	l of ass creditab	essment (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, information on whether
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					
Allocat	ion of p	olaces			
Additional information					
Workload					
<u>.</u>					
Master's wi	th 1 majoı	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. page 81 / 296 sik - 2011

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 82 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title					Abbreviation		
Atmosphere and Space Physics					11-AWP-092-m01		
Module	coord	inator		Module offered by			
Managi and Ast	ing Dire trophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites	i			
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew				
Conten	ts						
Structu tary ma exoplar	re of pl gnetos nets.	anetary atmospheres. pheres and interplane	Interaction of planetary tary medium. (Micro) m	y atmospheres with t neteorites, asteroids,	he Sun. Physics of c planetary rings. Atn	louds. Plane- nospheres of	
Intende	ed learı	ning outcomes					
The stu and nea ry spac	dents l ar-Eartl e missi	nave knowledge of the n space. They are able t ons.	physics of planetary at to apply the acquired k	mospheres, especia nowledge to the solu	lly of the atmospher ution of problems of	e of the Earth interplaneta-	
P V (n	S (type, n	mation on SWS (wook)	s, language — if other than Ger	rman)	ablo)		
Method	l of ass		y contact hours) and co	examination offered — if no	able)	ion on whether	
module is	creditab	le for bonus)			cevery semester, mornat	on on whether	
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 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.						amination in to 4 weeks) sessment demic and	
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Workload							
Teaching cycle							
Keterre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. reg. page 83 data record Master (120 ECTS) FOKUS Physik - 2011 page 83					page 83 / 296		



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

Module title				Abbreviation		
Particle Radiation Detectors					11-DTS-111-m01	
Module	e coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of	Applied Physics	blied Physics Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts					
Princip minatic	les of i on of m	nteraction between par omentum, energy and	ticles and matter. Parti particle identification.	cle detectors for spa Conception of partic	ce and time measur le detectors in exam	ement, deter- ples.
Intende	ed lear	ning outcomes				
The stu and ap basic k	dents l plicatio nowleo	know the physical prin ons of different types o lge of the conception o	ciples and the basic str f detectors, they can ex f detector systems.	ucture of particle de plain the measurem	tectors. They know t ent of physical value	he functions es and have
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V + Ü (r	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
a) writt groups project (approx Assess and wil examin Langua	en exai (appro report (, 30 m ment o l be an ation r ge of a	mination (approx. 90 m x. 30 minutes per canc (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form u egulations) 2009. ssessment: German, E	ninutes) or b) oral exam lidate, for modules with , time to complete: 1 to often assessment will l nder observance of See nglish	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection	date each or oral ex edits approx. 20 mir entation/seminar pre on the method of ase 3 ASPO (general aca	amination in 1utes) or c) 2sentation sessment demic and
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in					
Master's wi	Master's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. reg. page 85 / 296 data record Master (120 ECTS) FOKUS Physik - 2011					



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module	title				Abbreviation	
Modern Astrophysics					11-MAS-111-m01	
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of T lics	heoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Conten	ts					
Introdu	ction to	o a field of modern Astro	ophysics, e.g. extra-ga	lactic jets.		
Intende	ed learr	ning outcomes				
The stu lues an observa	dents d are to ational	know the current state c o plan and conduct obs project and e.g. to appl	f research on the mod ervations in this area. y for observation time	ern topic of Astrophy This includes the ab at large telescopes.	ysics. They know the ility to conceptualise	e physical va- e a specific
Courses	S (type, n	umber of weekly contact hours	, language — if other than Ge	rman)		
V + R (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	e essment (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	t every semester, informat	ion on whether
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.						amination in nutes) or c) esentation sessment demic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
			_			
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's wit	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 87 / 296



Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module title				Abbreviation		
Particle Physics (Standard Model)					11-TPS-092-m01	
Module	coord	inator		Module offered by		
Managing Directors of the Institute of Applied Phy the Institute of Theoretical Physics and Astrophys			Applied Physics and d Astrophysics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for			
Content	ts		-			
Introdu standar	ction to d mod	the theory of electrow el and determination of	eak interaction and sp model parameters.	ontaneous symmetry	y breaking. Experime	ents on the
Intende	d learr	ning outcomes				
The stup periment theoret	dents nts tha ical res	know the theoretical fur t have established and ults in the framework o	ndamental laws of the confirmed the standar f the standard model a	standard model of P d model. They are al and know its validity	article Physics and t ble to interpret exper and limits.	he key ex- rimental or
Courses	5 (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
R + V (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, langu le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
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.					amination in iutes) or c) esentation sessment demic and	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wit	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 89 / 296



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 90 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title				Abbreviation				
Astronomical Methods					11-ASM-131-m01			
Module	coord	inator		Module offered by				
Managing Director of the Institute of The and Astrophysics			Theoretical Physics	oretical Physics Faculty of Physics and Astronomy				
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
6	numerical grade							
Duratio	n	Module level	Other prerequisites					
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for					
Conten	ts							
Method tional d	ls of ob ata fro	oservational astronomy m radio, optical, X-ray	across the electromag and gamma-ray telesco	netic spectrum. Extra opes.	action and reduction	of observa-		
Intende	d learr	ning outcomes						
Overvie dio, opt ability t	w of th tical, X- o cond	e methods used in obs ray and gamma-ray en uct astronomical obse	ervational astronomy i ergies). Knowledge of p vations.	n various parts of th principles and applic	e electromagnetic sp ations of these meth	pectrum (ra- nods and		
Courses	5 (type, n	umber of weekly contact hours	s, language — if other than Ge	rman)				
V + R (n	o infor	mation on SWS (weekly	/ contact hours) and co	ourse language availa	able)			
Method module is	l of ass creditab	e ssment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether		
a) writte in group weeks) Assessi and will examin Langua	en exar os (app or d) p ment o l be an ation re ge of a	nination (approx. 90 m prox. 30 minutes per ca resentation/seminar p ffered: When and how nounced in due form u egulations) 2009. ssessment: German, En	inutes) or b) oral exam ndidate) or c) project r resentation (approx. 30 often assessment will l nder observance of Seo nglish	ination of one candi eport (approx. 8 to 10 o minutes) be offered depends o ction 32 Subsection 3	date each or oral exa p pages, time to com on the method of ase 3 ASPO (general aca	amination nplete: 1 to 4 sessment demic and		
Allocati	ion of p	olaces						
Additio	nal inf	ormation						
Workload								
Teaching cycle								
Keterred to In LPU I (examination regulations for teaching-degree programmes)								
Module	ahhag	15 11						
Master's wit	th 1 major	FOKUS Physics (2011)	Master's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. reg. page 91 / 2 data record Master (120 ECTS) FOKUS Physik - 2011 page 91 / 2					



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

Module title				Abbreviation		
Current	Current Topics of Experimental Physics				11-EXE6A-112-m01	
Module	e coordi	inator		Module offered by		
chairpe	erson of	examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current or stud	topics y abroa	of Experimental Physics. d.	Accredited academi	c achievements, e.g.	in case of change of university	
Intende	ed learr	ning outcomes				
The stu sics of t derstar fy the s	dents h the Ma nd the n ubject-	nave advanced competer ster's programme. They h neasuring and/or evalua specific contexts and kno	ncies corresponding t nave knowledge of a c tion methods necess ow the application ar	o the requirements o current subdiscipline ary to acquire this kr eas.	of a module of Experimental Phy- e of Experimental Physics and un- nowledge. They are able to classi-	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method	l of ass	essment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
module is	creditab	le for bonus)			idata ang kanang kananing ting	
in grou c) proje (approx Langua	ps (app ect repo k. 30 mi ge of a	orox. 30 minutes per canc orox. 30 minutes per canc ort (approx. 8 to 10 pages inutes) ssessment: German, Eng	lidate, for modules w , time to complete: 1 lish	ith less than 4 ECTS to 4 weeks) or d) pre	credits approx. 20 minutes) or esentation/seminar presentation	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teachir	ng cyclo	9				
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	rs in				
Master	's degre	ee (1 major) Physics (201	1)			
Master	Master's degree (1 major) FOKUS Physics (2011)					

Module title				Abbreviation	
Current Topics in Physics					11-EXP6-111-mo1
Module	coord	inator		Module offered by	
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duration	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval by examination	ation committee req	uired.
Content	s				
Current change	topics of univ	of Experimental and The versity or study abroad.	oretical Physics. Accr	redited academic acl	hievements, e.g. in case of
Intende	d learr	ning outcomes			
The stuc Theoreti subdisc knowlec	dents ł ical Ph ipline dge. Th	nave advanced competer ysics of the Master's prop of Physics and understar ney are able to classify th	cies corresponding t gramme of Nanostruc Id the measuring and e subject-specific cor	o the requirements of ture Technology. The I/or calculation methes ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + R (no	o infor	mation on SWS (weekly o	ontact hours) and co	urse language availa	able)
Method module is	of ass creditab	s essment (type, scope, langua ₎ le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte less oth minutes prox. 8 t tes) Languag	en exar erwise 5 per ca to 10 p ge of a	mination (approx. 120 mi e specified) or b) oral exa andidate, for modules win ages, time to complete: a ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr t to 4 weeks) or d) pre lish	ith less than 4 ECTS lidate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- camination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-
Allocati	on of p	olaces			
Addition	nal inf	ormation			
Workloa	ad				
Teachin	g cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	ins in			
Master's Master's Master's Master's	Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)				



Complex Systems, Quantum Control and Biophysics (Experiment)

(ECTS credits)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 95 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title					Abbreviation	
Biophy	sical M	easurement Technolo	gy in Medical Science		11-BMT-092-m01	
Module	e coord	inator		Module offered by		
Managi	ing Dire	ector of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6 numerical grade						
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew			
Conten	ts					
The lec topics a sound a image p	ture co are con and MR process	vers the physical princ ventional X-ray technic R-tomography. The lect sing.	iples of imaging techni que, computer tomogra ure additionally addres	ques and their appli phy, imaging technic ses systems theory o	cation in Biomedicin ques of nuclear med of imaging systems a	e. The main icine, ultra- and digital
Intende	ed learı	ning outcomes				
The stu derstar images	dents l nd the p	know the physical prin principles of image ger	ciples of imaging techn leration and are able to	iques and their appl explain different tec	ication in Biomedici chniques and interpr	ne. They un- et simple
Course	S (type, n	umber of weekly contact hou	s, language — if other than Gei	rman)		
R + V (n	o infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	s essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether
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.					amination in nutes) or c) esentation sessment demic and	
Allocat	ion of p	olaces				
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wi	ith 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 96 / 296





Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2012)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.		
	data record Master (120 ECTS) FOKUS Physik - 2011		

Module title					Abbreviation	
Labora	tory an	d Measurement Technol	ogy in Biophysics		11-LMB-092-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	lied Physics Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for				
Conten	ts		L			
The lec physica measu methoo	ture co al proce ring tec ds of st	vers relevant principles or edures for the examination hniques and sensors, mo ructure elucidation of bio	of molecular and cellu on and manipulation o ethods of single-parti omolecules.	ular biology as well a of biological systems cle detection, specia	s the physical principles of bio- s. The main topics are optical al microscoping techniques and	
Intend	ed lear	ning outcomes				
The stu sical pi measu biomol	Idents l rocedui ring tec lecules.	know the principles of mo res for the examination a hniques and their applic	blecular and cellular h nd manipulation of b ations and are able to	biology as well as the iological systems. Th o apply techniques o	e physical principles of biophy- ney have knowledge of optical of structure elucidation to simple	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Metho module is	d of ass s creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writt groups project (approz Assess	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					
examir	ll be an nation r	egulations) 2009.	ier observance of Sec	ction 32 Subsection	3 ASPO (general academic and	
	ige of a	ssessment: German, Eng	usn			
Allocat						
Additional information						
Worklo	Workload					
Teachi	Teaching cycle					
	0.94					

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Functional Materials (2012)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 99 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title					Abbreviation		
Nano-O	Nano-Optics				11-NOP-092-m01		
Module	coord	inator		Module offered by			
Managi	ng Dire	ector of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
4	nume	rical grade					
Duratio	n	Module level	Other prerequisites	i			
1 semester gr		graduate	Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtaine the course of the se sessment into effect ted to assessment i sessment at a later admission to asses	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts						
Theoret quantu	tical pri m emit	inciples. Focussing of l ters. Light emission in	ght. Microscopy. Optic nano-tailored environr	al nearfield probes. nents. Plasmons. Op	Nearfield microscop tical antennas.	y. Single	
Intende	ed leari	ning outcomes					
The stu retical p	dents l orincip	have specific and adva les and application are	nced knowledge in the as of nano-optics and	field of nano-optics. with current develop	They are familiar wi ments in this field.	th the theo-	
Course	S (type, n	number of weekly contact hours	s, language — if other than Ge	rman)			
R + V (n	o infor	mation on SWS (weekly	/ contact hours) and co	ourse language avail	able)		
Methoo module is	of ass	sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether	
a) writte groups project (approx Assess and wil examin Langua	en exar (appro report 3. 30 m ment o l be an ation r ge of a	mination (approx. 90 m x. 30 minutes per cand (approx. 8 to 10 pages, inutes) ffered: When and how nounced in due form u egulations) 2009. ssessment: German, El	inutes) or b) oral exam idate, for modules wit time to complete: 1 to often assessment will nder observance of Se	ination of one candi h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection	date each or oral exa edits approx. 20 mir entation/seminar pre on the method of ase 3 ASPO (general aca	amination in nutes) or c) esentation sessment demic and	
Allocat	ion of p	olaces	<u> </u>				
Additio	nal inf	ormation					
Worklo	ad						
Teaching cycle							
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in							
Bachel	or' deg	ree (1 major) Physics (2	010)				
Master's wi	Master's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. reg. page 100 / 29 data record Master (120 ECTS) FOKUS Physik - 2011						

Julius-Maximilians-UNIVERSITÄT WÜRZBURG



Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

Module title					Abbreviation		
Statistics, Data Analysis and Computer Physics 11-SDC-092-m01							
Module coordinator				Module offered by			
Managing Director of the Institute of Ap			Applied Physics	oplied Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. con	Only after succ. compl. of module(s)			
4	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 semester graduate		graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.				
Conter	Its						
Statist	ics, dat	a analysis and comput	er physics.				
Intend	ed lear	ning outcomes					
The stu Physic	ıdents l s.	nave specific and adva	nced knowledge in the	field of statistics, da	ita analysis and Com	ıputational	
Course	S (type, r	umber of weekly contact hour	s, language — if other than Gei	rman)			
R + V (I	no infor	mation on SWS (weekl	y contact hours) and co	ourse language availa	able)		
Metho module i	d of ass s creditab	essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether	
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							
Allocation of places							
Additional information							
Workload							
leaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in Pashalar' dagraa (a majar) Dhysics (aada)							
Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012)							
Master's w	ith 1 majo	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 102 / 296	

Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2010)

Julius-Maxir

UNIVERSITÄT

WÜRZBURG

Module title					Abbreviation	
Current Topics of Experimental Physics					11-EXE6A-112-m01	
Module coordinator				Module offered by		
chairpe	erson of	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS Method of grading Only after succ. com			Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Approval by examination	oval by examination committee required.		
Conten	ts					
Current or stud	topics y abroa	of Experimental Physics. Id.	Accredited academi	c achievements, e.g.	in case of change of university	
Intende	ed learr	ning outcomes				
The students have advanced competencies corresponding to the requirements of a module of Experimental Phy- sics of the Master's programme. They have knowledge of a current subdiscipline of Experimental Physics and un- derstand the measuring and/or evaluation methods necessary to acquire this knowledge. They are able to classi- fy the subject-specific contexts and know the application areas.						
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method	l of ass	essment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
module is	creditab	le for bonus)				
a) written examination (approx. 120 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) Language of assessment: German, English						
Allocation of places						
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master	s degre	ee (1 major) Physics (201	1)			
Master	Master's degree (1 major) FOKUS Physics (2011)					

Module title					Abbreviation	
Current Topics in Physics					11-EXP6-111-mo1	
Module coordinator				Module offered by		
chairperson of examination committee				Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	numei	rical grade				
Duration	n	Module level	Other prerequisites			
1 semes	ter	graduate	Approval by examination	Approval by examination committee required.		
Content	S					
Current change	topics of univ	of Experimental and The versity or study abroad.	oretical Physics. Accr	redited academic acl	hievements, e.g. in case of	
Intende	d learr	ning outcomes				
The stuc Theoreti subdisc knowled	dents ł ical Ph ipline lge. Th	nave advanced competen ysics of the Master's prog of Physics and understar rey are able to classify the	cies corresponding t gramme of Nanostruc Id the measuring and e subject-specific cor	o the requirements of ture Technology. The I/or calculation methes ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.	
Courses	(type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)		
V + R (no	o infor	mation on SWS (weekly c	ontact hours) and co	urse language availa	able)	
Method module is a	of ass creditab	essment (type, scope, languag le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; un- less otherwise specified) 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 (ap- prox. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minu- tes)						
Allocation of places						
Addition	nal info	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)						



Current Topics in Experimental Physics

(ECTS credits)

Naster's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 106 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title					Abbreviation		
Current	Topics	s in Experimental Physics		11-EXE5-111-m01			
Module coordinator				Module offered by			
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy		
ECTS Method of grading Only after succ. com			Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites	Other prerequisites			
1 seme	ster	graduate	Approval by examina	ation committee req	uired.		
Conten	ts						
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university		
Intende	ed learı	ning outcomes					
The stu sics of derstar fy the s	dents l the Ma nd the r ubject-	nave advanced competer ster's programme. They h neasuring and/or evalua specific contexts and kn	ncies corresponding t have knowledge of a c tion methods necess ow the application ar	o the requirements o current subdiscipline ary to acquire this kr eas.	of a module of Experimental Phy- e of Experimental Physics and un- nowledge. They are able to classi-		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)							
a) written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; un- less otherwise specified) 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 (ap- prox. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minu- tes)							
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module appears in							
Master's degree (1 major) Physics (2010)							
Master's degree (1 major) Physics (2011)							
Master's degree (1 major) FOKUS Physics (2010)							
Master	Master's degree (1 major) FUKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)						
master s degree (1 major) i okos enysits (2000)							

Module title		Abbreviation			
Current Topi	cs in Experimental Physics	5		11-EXE6-111-m01	
Module coordinator			Module offered by		
chairperson of examination committee			Faculty of Physics a	nd Astronomy	
ECTS Met	nod of grading	Only after succ. com	pl. of module(s)		
6 num	erical grade				
Duration	Module level	Other prerequisites			
1 semester	graduate	Approval by examination	ation committee req	uired.	
Contents					
Current topic or study abro	s of Experimental Physics oad.	. Accredited academi	c achievements, e.g.	. in case of change of university	
Intended lea	rning outcomes				
The students sics of the M derstand the fy the subjec	have advanced competer aster's programme. They h measuring and/or evalua t-specific contexts and kn	ncies corresponding t nave knowledge of a c tion methods necess ow the application ar	o the requirements o current subdiscipline ary to acquire this kr eas.	of a module of Experimental Phy- e of Experimental Physics and un- nowledge. They are able to classi-	
Courses (type	, number of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (no info	ormation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Method of as module is credita	ssessment (type, scope, langua able for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; un- less otherwise specified) 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 (ap- prox. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minu- tes) Language of assessment: German, English					
Allocation of	places				
Additional in	formation				
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
·					
Module appears in					
Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)					
Module title					Abbreviation
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Current Topics in Experimental Physics					11-EXE7-111-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
7	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed leari	ning outcomes			
The stu sics of t derstan fy the s	dents l the Ma nd the r ubject-	nave advanced competer ster's programme. They h neasuring and/or evalua specific contexts and kno	ncies corresponding t have knowledge of a c tion methods necess ow the application ar	o the requirements of current subdiscipline ary to acquire this kr eas.	of a module of Experimental Phy- e of Experimental Physics and un- nowledge. They are able to classi-
Course	S (type, n	number of weekly contact hours, l	anguage — If other than Ger	man)	-11-)
V + R (n		mation on SWS (weekly o	contact nours) and co	urse language availa	adle)
module is	creditab	le for bonus)	ge — If other than German, e	examination offered — if no	it every semester, information on whether
a) writte less oth minute prox. 8 tes) Langua	en exar nerwise s per ca to 10 p ge of a	nination (approx. 120 mi e specified) or b) oral exa andidate, for modules wi ages, time to complete: ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr 1 to 4 weeks) or d) pre lish	ith less than 4 ECTS lidate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- kamination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ıg cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)					
master s degree (1 major) foros physics (2000)					

Module title					Abbreviation
Current Topics in Experimental Physics					11-EXE8-111-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or stud	topics y abroa	of Experimental Physics. ad.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed learı	ning outcomes			
The stu sics of derstar fy the s	dents l the Ma nd the r ubject-	nave advanced competer ster's programme. They h neasuring and/or evalua specific contexts and kn	ncies corresponding t have knowledge of a c tion methods necess ow the application ar	o the requirements o current subdiscipline ary to acquire this kr eas.	of a module of Experimental Phy- e of Experimental Physics and un- nowledge. They are able to classi-
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte less oth minute prox. 8 tes) Langua	en exar nerwise s per ca to 10 p ge of a	nination (approx. 120 mi e specified) or b) oral exa andidate, for modules wi ages, time to complete: ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr 1 to 4 weeks) or d) pre lish	ith less than 4 ECTS idate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- camination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	Teaching cycle				
-					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) Physics (2010)					
Master	Master's degree (1 major) Physics (2011)				
Master	's degr	ee (1 major) FOKUS Physi	cs (2010)		
Master	's degri	ee (1 major) FUKUS Physi	CS (2011)		
Master S degree (1 Major) FORUS Physics (2006)					

Module title				Abbreviation	
Current Topics of Experimental Physics				11-EXE6A-112-m01	
Module	coord	nator		Module offered by	
chairpe	erson of	examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or study	topics y abroa	of Experimental Physics. d.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	ed learr	ing outcomes			
The stu sics of t derstan fy the s Course	dents h the Mas nd the n ubject- s (type, n	nave advanced competer ster's programme. They h neasuring and/or evaluat specific contexts and kno umber of weekly contact hours, k	acies corresponding t have knowledge of a c tion methods necess how the application ar anguage – if other than Ger	o the requirements o current subdiscipline ary to acquire this kr eas. man)	of a module of Experimental Phy- e of Experimental Physics and un- nowledge. They are able to classi-
V + R (n	infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)
Methoo module is	d of ass creditab	essment (type, scope, language) le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte in grou c) proje (approx Langua	en exar ps (app ect repo k. 30 mi ge of a	nination (approx. 120 mi prox. 30 minutes per cano rt (approx. 8 to 10 pages inutes) ssessment: German, Eng	nutes) or b) oral exan lidate, for modules w , time to complete: 1 lish	nination of one cand rith less than 4 ECTS to 4 weeks) or d) pre	idate each or oral examination credits approx. 20 minutes) or esentation/seminar presentation
Allocat	ion of p	laces			
Additio	nal info	ormation			
Worklo	ad				
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	rs in			
Master'	's degre	ee (1 major) Physics (2013	1) 55 (2014)		
Master's degree (1 major) FUKUS Physics (2011)					

Module title				Abbreviation	
Current Topics in Physics					11-EXP6-111-mo1
Module	coord	inator		Module offered by	
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duration	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval by examination	ation committee req	uired.
Content	s				
Current change	topics of univ	of Experimental and The versity or study abroad.	oretical Physics. Accr	redited academic acl	hievements, e.g. in case of
Intende	d learr	ning outcomes			
The stuc Theoreti subdisc knowlec	dents ł ical Ph ipline dge. Th	nave advanced competer ysics of the Master's prop of Physics and understar ney are able to classify th	cies corresponding t gramme of Nanostruc Id the measuring and e subject-specific cor	o the requirements of ture Technology. The I/or calculation methes ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + R (no	o infor	mation on SWS (weekly o	ontact hours) and co	urse language availa	able)
Method module is	of ass creditab	s essment (type, scope, langua ₎ le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte less oth minutes prox. 8 t tes) Languag	en exar erwise 5 per ca to 10 p ge of a	mination (approx. 120 mi e specified) or b) oral exa andidate, for modules win ages, time to complete: a ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr t to 4 weeks) or d) pre lish	ith less than 4 ECTS lidate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- camination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-
Allocati	on of p	olaces			
Addition	nal inf	ormation			
Workloa	ad				
Teachin	Teaching cycle				
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's Master's Master's Master's	Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)				



Theoretical Physics

(ECTS credits)

Students must achieve a minimum of 5 ECTS credits.



Applied Physics and Metrology (Theory) (ECTS credits)

Master's with 1 major FOKUS Physics (2011)	
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Module title					Abbreviation	
Introdu	ction t	o Plasmaphysics			11-EPP-092-m01	
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of ⁻ sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for			
Conten	ts					
Plasma Transpo thin the celerati	Astrop ort equ solar on and	hysics: Dynamics of ch ations for energetic par wind, Particle accelerat I transport in galaxies a	arged particles in elect ticles, Properties of ma ion via shock waves ar nd other astrophysical	tric and magnetic fie agnetic turbulence, P nd via interaction wit objects, Cosmic rad	lds, Magnetohydrod Propagation of solar h plasma turbulence iation.	ynamics, particles wi- e, Particle ac-
Intende	ed learn	ning outcomes				
The stu ma. The	dents l ey are a	know the principles of F able to solve basic prob	Plasma Physics, especi lems of Plasma Physic	ally the description of and to apply this k	of transport phenom nowledge to Astroph	ena in plas- iysics.
Courses	5 (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, lang le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
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.					amination in nutes) or c) esentation sessment demic and	
Allocati	ion of p	olaces				
Additional information						
<u></u>						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	xam. reg. ik - 2011	page 115 / 296





Module appears in Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

Module	Module title					
Thermo	Thermodynamics and Economics 11-TD0-092-m01					
Module	Module coordinator Module					
Managi and Ast	ing Dire trophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
6	nume	rical grade		•		
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for				
Conton	+c			sment anew.		
Energy and economic growth, entropy production, emission reduction. Part I describes the role of energy conversion in the development of the universe, the evolution of life and the unfolding of civilisation. In non-equilibrium thermodynamics, the entropy production density shows the relevance of the second law of thermodynamics for ecological damage and resource consumption. Energy conversion, entropy production and natural resources define the technological and ecological boundaries of industrial economic growth. Part 2 analyses how the factors capital, work, energy and creativity produce the goods and services of a national economy and determine economic growth. The productive power of cheap energy by far exceeds that of expensive labour. Within the current system of taxes and social security contributions, this discrepancy between power and costs of production factors leads to job cuts, waste of resources, impoverishment of nations and growing social tensions. The course discusses how factor income taxation can counteract this development. Part 3 includes seminar presentations, comprises the techniques of rational energy use and non-fossil energy use, and introduces the optimisation programme deeco (Dynamic Energy, Emission and Cost Optimization). Intended learning outcomes The students understand that energy conversion and entropy production are going to play an important role in the world's economic and social development. As an extension of economic theory, the students know the connections between thermodynamics and economy as well as the productive physical basis of modern economies. They are able to apply the acquired knowledge to particular problems.						
Course	S (type, r	umber of weekly contact hour	s, language — if other than Ge	rman)		
R + V (n	io infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)						
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						
Master's wi	th 1 majo	FOKUS Physics (2011)	JMU Würzburg	• generated 26-Aug-2024 • e	exam. reg.	page 117 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011					

Allocation of places

Additional information

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Workload

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Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 118 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title					Abbreviation
Thermodynamics and Economics					11-TDOE-141-m01
Module	coord	inator		Module offered by	
Managi and Ast	ng Dire rophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	ıpl. of module(s)	
3	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
Energy and economic growth, entropy production, emission reduction. Part I describes the role of energy conversion in the development of the universe, the evolution of life and the un- folding of civilisation. The entropy production density of non-equilibrium thermodynamics shows the relevance of the second law of thermodynamics for ecological damage and resource consumption. Energy conversion, ent- ropy production and natural resources define the technological and ecological boundaries of industrial econo- mic growth. Part 2 analyses how the factors capital, work, energy and creativity produce the goods and services of a national economy and determine economic growth. The productive power of cheap energy by far exceeds that of expensi- ve labour. Within the current system of taxes and social security contributions, this discrepancy between power and costs of production factors leads to job cuts, waste of resources, impoverishment of nations and growing so- cial tensions. The course discusses how factor income taxation can counteract this development. Part 3 includes seminar presentations, comprises the techniques of rational energy use and non-fossil energy use, and introduces the optimisation programme deeco (Dynamic Energy, Emission and Cost Optimization). Intended learning outcomes The students understand that energy conversion and entropy production are going to play an important role in the world's economic and social development. As an extension of economic theory, the students know the connections between thermodynamics and economy as well as the productive physical basis of modern econo- mies. They are able to apply the acquired knowledge to particular problems. NOTF: this is the module that was run by Prof. Dr. R. Kimmel, who has now retired. As the module was tailored to					
Course	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V (no in	format	ion on SWS (weekly cont	act hours) and cours	e language available)
Method module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte in group weeks)	en exar os (app or d) p	mination (approx. 90 min prox. 30 minutes per cano resentation/seminar pres	utes) or b) oral exam lidate) or c) project re sentation (approx. 30	ination of one candic eport (approx. 8 to 10 minutes)	date each or oral examination o pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additional information					
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	

Master's with 1 major FOKUS Physics (2011)	IMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 119 / 296
······································	data record Master (120 ECTS) FOKUS Physik - 2011	p=3==-y , =y=

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

Module title				Abbreviation		
Current Topics of Theoretical Physics					11-EXT6A-112-m01	
Module	coord	inator		Module offered by		
chairpe	rson o	f examination committee	_	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current study a	topics broad.	of Theoretical Physics. A	ccredited academic a	achievements, e.g. ir	n case of change of university or	
Intende	ed learr	ning outcomes				
The stu sics of t sics and of Theo	dents ł the Ma d have retical	nave advanced competer ster's programme. They h mastered the required m Physics.	ncies corresponding t nave advanced specia ethods. They are able	o the requirements o alist knowledge of a e to apply the acquir	of a module of Theoretical Phy- subdiscipline of Theoretical Phy- red methods to current problems	
Courses	S (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method	l of ass	essment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte in group c) proje (approx Langua	en exar os (app oct repo x. 30 m ge of a	nination (approx. 120 mi prox. 30 minutes per cano ort (approx. 8 to 10 pages inutes) ssessment: German, Eng	nutes) or b) oral exan lidate, for modules w , time to complete: 1 lish	nination of one cand ith less than 4 ECTS to 4 weeks) or d) pre	lidate each or oral examination credits approx. 20 minutes) or esentation/seminar presentation	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	appea	irs in				
Master'	s degre	ee (1 major) Physics (201	1)			
Master'	Master's degree (1 major) FOKUS Physics (2011)					

Module title				Abbreviation	
Current Topics in Physics					11-EXP6-111-mo1
Module	coord	inator		Module offered by	
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duration	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval by examination	ation committee req	uired.
Content	s				
Current change	topics of univ	of Experimental and The versity or study abroad.	oretical Physics. Accr	redited academic acl	hievements, e.g. in case of
Intende	d learr	ning outcomes			
The stuc Theoreti subdisc knowlec	dents ł ical Ph ipline dge. Th	nave advanced competer ysics of the Master's prop of Physics and understar ney are able to classify th	cies corresponding t gramme of Nanostruc Id the measuring and e subject-specific cor	o the requirements of ture Technology. The I/or calculation methes ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + R (no	o infor	mation on SWS (weekly o	ontact hours) and co	urse language availa	able)
Method module is	of ass creditab	s essment (type, scope, langua ₎ le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte less oth minutes prox. 8 t tes) Languag	en exar erwise 5 per ca to 10 p ge of a	mination (approx. 120 mi e specified) or b) oral exa andidate, for modules win ages, time to complete: a ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr t to 4 weeks) or d) pre lish	ith less than 4 ECTS lidate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- camination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-
Allocati	on of p	olaces			
Addition	nal inf	ormation			
Workloa	ad				
Teachin	Teaching cycle				
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's Master's Master's Master's	Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)				



Solid State Physics and Nanostructures (Theory)

(ECTS credits)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.
	data record Master (120 ECTS) FOKUS Physik - 2011

Module	e title				Abbreviation		
Quantu	Quantum Mechanics II 11-QM2-092-m01						
Module	e coord	inator		Module offered by			
Managi and As	ing Dire trophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)			
8	nume	rical grade					
Duratio	on	Module level	Other prerequisites	;			
1 semesterUndergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective de 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 the course of the semester, the lecturer will put their registration for sessment into effect. Students who meet all prerequisites will be acted to assessment at a later date, students will have to obtain the qualification					o as- ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for		
Conten	ts	L					
Physics gree. W should 1. Seco 2. Band 3. Angu 4. Scatt 5. Relat of atom 6. Quan 7. Cance Intende The stu of the r moderr thods a High-Er	 "Quantum mechanics II" constitutes the central theoretical course of the international Master's program in Physics. It builds upon basics which are acquired in the lecture "Quantum mechanics I" of the Bachelor's degree. While the specific emphasis can be adjusted individually, the core topics that are supposed to be covered should include: 1. Second quantisation: Fermions and bosons 2. Band structures of particles in a crystal 3. Angular momentum, symmetry operators, Lie Algebras 4. Scattering theory: Potential scattering, partial wave expansion 5. Relativistic quantum mechanics: Klein-Gordon equation, Dirac equation, Loretz group, fine structure splitting of atomic spectra 6. Quantum entanglement 7. Canonical formalism Intended learning outcomes The students acquire in-depth knowledge of advanced quantum mechanics and have a thorough understanding of the mathematical and theoretical concepts of the listed topics. They are able to describe or model problems of modern theoretical Quantum Physics mathematically, to solve problems analytically, to use approximation methods.						
dents.		,		,			
Course	S (type, r	number of weekly contact hours	s, language — if other than Ge	rman)			
R + V (r	no infor	mation on SWS (weekly	y contact hours) and co	ourse language availa	able)		
Method module is	d of ass creditab	sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether	
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							
Master's wi	ith 1 maio	r FOKUS Physics (2011)	IMU Würzhurs	s • generated 26-Aug-2024 • 6	exam. reg.	page 124 / 206	
Musici s W			data record M	Master (120 ECTS) FOKUS Phys	5ik - 2011	pube 124 / 290	

Allocation of places
Additional information
Workload
-
Teaching cycle
Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)

Master's with 1 major FOKUS Physics (2011)

Module	Module title				Abbreviation
Many B	Body Qi	uantum Theory			11-QVTP-092-m01
Module	e coord	inator		Module offered by	
Managi and Ast	Managing Director of the Institute of Theoretic and Astrophysics		neoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semestergraduateCertain prerequisites must be met to qualify for admission to sessment. The lecturer will inform students about the respectation of the course. Registration for the course will at the beginning of the course. Registration for the course will entry a declaration of will to seek admission to assessmed dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registres sessment into effect. Students who meet all prerequisites wited to assessment in the current or in the subsequent semester.			alify for admission to as- nts about the respective details ion for the course will be con- hission to assessment. If stu- r admission to assessment over will put their registration for as- it all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for		
Conten	ts				
Green's An outl 1 Single 2 Revie 3 Diagr 4 Diagr 5 Landa 6 Supe 7 One-c	s functi ine cou e-partic w of se ammat aummat au theo rcondu Jimens	ons. Ild be: cle Green's function cond quantization ic method using many pa ic method for finite T ory of Fermi liquids ctivity ional systems and bosor	article Green's functio	ons at temperature T	=0
Intende	ed lear	ning outcomes			
The stu ply the	dents l acquir	have mastered the princi ed methods to current pr	ples of quantum fielc oblems of Theoretica	l theory in many-part l Solid-State Physics	icle systems. They are able to ap-
Course	S (type, r	number of weekly contact hours,	language — if other than Gei	rman)	
R + V (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)
Methoo module is	d of ass creditab	sessment (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	t every semester, information on whether
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					
Allocat	Allocation of places				
Additio	nal inf	ormation			
	-				
L					

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Workload

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 127 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module	Module title				Abbreviation	
Relativi	Relativistic Effects in Mesoscopic Systems				11-RMS-092-m01	
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire trophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
DurationInocute tevelOther prerequisites1 semestergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective of at the beginning of the course. Registration for the course will be of sidered a declaration of will to seek admission to assessment. If sidents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration for sessment into effect. Students who meet all prerequisites will be ted to assessment at a later date, students will have to obtain the qualification			o as- ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for			
Conten	ts		-			
Relativi logical	stic eff insulat	ects in mesoscopic sys ors Majorana fermior	tems Spin-orbit coup Is	oling Dirac equatio	n Quantum Hall ef	fect Topo-
Intende	ed learı	ning outcomes				
The stu especia	dents l ally in t	nave mastered the mat he field of mesoscopic	nematical methods for physics. They are able	the description of re to apply their knowl	lativistic quantum s edge to simple syste	ystems, ems.
Courses	S (type, n	umber of weekly contact hours	, language — if other than Ge	rman)		
R + V (n	o infor	mation on SWS (weekly	r contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
a) writte groups project (approx Assessi and wil examin Langua	en exar (appro report 3. 30 m ment o l be an ation re ge of a	mination (approx. 90 m x. 30 minutes per cand (approx. 8 to 10 pages, inutes) ffered: When and how o nounced in due form u egulations) 2009. ssessment: German, Er	inutes) or b) oral exam idate, for modules with time to complete: 1 to often assessment will h nder observance of Sec nglish	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection 3	date each or oral exa edits approx. 20 mir entation/seminar pre on the method of ase 3 ASPO (general aca	amination in nutes) or c) esentation sessment demic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
KETEFIFED TO IN LPUT (examination regulations for teaching-degree programmes)						
module	מטעעניב מאורפעו אווי					
Master's wi	th 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. ;ik - 2011	page 128 / 296



Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)

Module title					Abbreviation	
Theoret	Theoretical Solid State Physics				11-TFK-092-m01	
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of ics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. If dents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. sessment at a later date, students will have to obtain the qualific) as- tive details Il be con- nt. If stu- ssment over tion for as- till be admit- ster. For as- alification for			
Conten	ts					
Principl thods. I	es of T Magnet	heoretical Solid-State F ism. Superconductivity	Physics. Fermi liquid th	eory. Electron-electro	on interaction. Varia	tional me-
Intende	d learr	ning outcomes				
The stur respond theory a an adva	dents h ding ma and to anced t	nave basic knowledge of athematical or theoretion understand the connection opic of solid-state theoretic	of the theoretical descr cal methods and are al tions to experimental r ry and have discussed	iption of solid-state ole to apply them to results. The individua this topic in a semir	phenomena. They kr basic problems of sc al students have elal nar presentation.	now the cor- olid-state borated on
Courses	5 (type, n	umber of weekly contact hours	s, language — if other than Ger	rman)		
R + V (n	o infor	mation on SWS (weekly	/ contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
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.						
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Teachin	ig cycl	9				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
waster's wi	ui i major	FUNUS PHYSICS (2011)	JMU Wurzburg data record N	• generated 26-Aug-2024 • 6 Aaster (120 ECTS) FOKUS Phys	sik - 2011	page 130 / 296





Module appears in Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

Master's with 1 major FOKUS Physics (2011)

Module	Module title				Abbreviation	
Theory	of Sup	erconduction			11-TSL-092-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of The and Astrophysics			eoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. If dents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. sessment at a later date, students will have to obtain the qualifi			alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for			
Conten	ts	<u> </u>	I			
Introdu Phenon vity (An elemen	ction to nenolo dreev ts.	o the phenomenom of su gical theory of supercond scattering, Bobolioubov-	perconductivity. Micr Juctivity (Ginzburg-La de Gennes equation,	roscopic theory of su Indau theory). Mesos SQUIDS). Quantum o	perconductivity (BCS theory). scopic aspects of superconducti- computing with superconductive	
Intende	ed lear	ning outcomes				
The stu the pro blems.	dents perties	have basic knowledge of and application areas o	the theoretical mode f these models and a	ls for the descriptior re able to apply calc	n of superconductivity. They know ulation methods to simple pro-	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
R + V (n	io infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Methoo module is	d of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether	
a) writte groups project (approx Assess and wil examin Langua	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.					
Allocat	Allocation of places					
Additional information						
Worklo	ad					
Teachir	Teaching cycle					

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Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)

Module	title			Abbreviation		
Renormalization Group Methods in Field Theory					11-RMFT-102-m01	
Module	coord	inator		Module offered by		
Managi and Ast	Managing Director of the Institute of Theoretica and Astrophysics			Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateCertain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective of at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. If a dents have obtained the qualification for admission to assessme the course of the semester, the lecturer will put their registration is sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. If sessment at a later date, students will have to obtain the qualification			o as- ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for			
Conten	ts					
Renorm analyse	alisati d beha	on group methods for r aviour of cryogenic tem	ion-linear partial differ peratures.	ential equations, fiel	d theoretical contex	ts and non-
Intende	ed learr	ning outcomes				
The stu of the re	dents g enorma	gain an overview of nor alisation group method	I-linearities in partial d	ifferential equations	and their solution o	n the basis
Courses	5 (type, n	umber of weekly contact hour	s, language — if other than Ge	rman)		
V + R (n	o infor	mation on SWS (weekl	/ contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	e ssment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
a) writte groups project (approx Assessi and wil examin Langua	en exar (appro report a. 30 mi ment o l be an ation re ge of a	nination (approx. 90 m x. 30 minutes per cand (approx. 8 to 10 pages inutes) ffered: When and how nounced in due form u egulations) 2009. ssessment: German, El	inutes) or b) oral exam idate, for modules with time to complete: 1 to often assessment will l nder observance of Sec nglish	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection	date each or oral exa edits approx. 20 mir entation/seminar pre on the method of ase 3 ASPO (general aca	amination in nutes) or c) esentation sessment demic and
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	Module appears in					
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 134 / 296



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2010)

Module	Module title				Abbreviation	
Electro	Electron Electron Interaction				11-EEW-102-m01	
Module	Module coordinator			Module offered by		
Managing Director of the Institute of Th and Astrophysics			neoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateCertain prerequisites must be met to qualify for admission to sessment. The lecturer will inform students about the respect at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assess 			as- tive details Il be con- nt. If stu- ssment over tion for as- till be admit- ster. For as- alification for			
Conten	ts					
1. Introc teractio thod of dels. 10	duction n). 4. li functio . Impu	n, systems, Landau theor ntroduction to boson pha onal integrals. 7. Renorm rities in Luttinger liquids	y2. Interacting electro ase fields and interac alisation groups.8. Co	on gas. 3. One-dimen tions. 5. Calculation onsideration of spin.	nsional electron gas of correlation functi 9. One-dimensiona	(without in- ons. 6. Me- l lattice mo-
Intende	d learr	ning outcomes				
The stu on.	dents k	know the principles of th	e theoretical descript	ion of electron-elect	ron interactions in o	ne dimensi-
Courses	5 (type, n	umber of weekly contact hours, I	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, informati	on on whether
a) writte groups project (approx Assessi and will examin Langua	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.					
Allocati	ion of p	olaces				
			······			
Additio	nal info	ormation				
Worklo	ad					
Teachin	ıg cycl	9				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Master's wit	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	● generated 26-Aug-2024 ● e laster (120 ECTS) FOKUS Phys	exam. reg. iik - 2011	page 136 / 296



Module appears in

Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module title				Abbreviation	
Theoretical Solid State Physics 2 11-TFK2-111-m01					
Module coordinator			Module offered by		
Managing Director of the Institute of Th and Astrophysics		heoretical Physics	Faculty of Physics and Astronomy		
ECTS Meth	od of grading	Only after succ. con	npl. of module(s)		
8 num	erical grade				
Duration	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for			
Contents					
 a) metal-insulators and topological insulators b) transport phenomena c) magnetic impurities in metals. Kondo effect and heavy fermions d) electron-phonon interaction e) one-dimensional conductors Intended learning outcomes The students have advanced knowledge of the theoretical description of solid-state phenomena. They know the mathematical or theoretical methods and are able to apply them to problems of solid-state theory and understand the connections to experimental results. The individual students have elaborated on an advanced topic of					
Courses (type,	number of weekly contact hours,	language — if other than Ger	rman)		
V + R (no info	V + R (no information on SWS (weekly contact hours) and course language available)				
Method of as module is credita	s essment (type, scope, langu ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
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					
Allocation of places					
Additional in	formation				
Workload					

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Naster's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 139 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	1

Module title					Abbreviation	
Critical Phenomena				11-CRP-131-m01		
Module coordinator				Module offered by		
Managing Director of the Institute of Th and Astrophysics			Theoretical Physics	Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment in sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for			
Conten	ts		1			
In Statis transition plays and and to r scaling tempera	stical P ons. Th n impo renorm relatio ature d	Physics, critical phenom e theory, which can be rtant role in many areas alisation group theory a nships, critical exponen evelopment. Finite size	ena refer to the univer explained through crit s of Physics. The lectur and discusses selected nts. Mean field theory. scaling theory. Exact s	sal behaviour in the ical phenomena, is c e serves as an introd d applications. Basic Renormalisation gro solutions.	proximity of continu called renormalisation luction to critical ph- phenomenology: Un up theory. Duality a	ous phase on group and enomena niversality, nd high-/low-
Intende	d learr	ning outcomes				
The stu thods to	dents l o simp	know the principles of t le problems.	he theory of critical ph	enomena and are ab	le to apply the calcu	Ilation me-
Courses	5 (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
Method module is	Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					ion on whether
a) written examination project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks), presentation/semi- nar 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						
Allocation of places						
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wit	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. iik - 2011	page 140 / 296



Module appears in

Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg ● generated 26-Aug-2024 ● exam. reg.
	data record Master (120 ECTS) FOKUS Physik - 2011

Module	e title				Abbreviation	
Disordered Systems					11-UGS-131-m01	
Module	e coord	inator		Module offered by		
Manag and As	ing Dire trophys	ector of the Institute of Th sics	neoretical Physics	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semesters				
Conten	ts					
help of quantum statistical methods which are introduced in a separate lesson. The students learn to calculate transport properties, magnetic instabilities and phase transitions as well as competing orders. Part II: Part II covers non-linear partial differential equations, which also describe systems far beyond equilibrium and systems with random inhomogeneity. Where applicable, exact solubility in a space dimension will be covered; otherwise and in more than one space dimension, diagram methods and renormalisation groups are applied, which will be introduced separately. As a methodological development of the methods of the course Mathematics 3, the path integral method is derived for classical and quantum mechanical models and differential equations (e.g. Feynman Kas method).						
Intende	ed lear	ning outcomes				
The students acquire insights into the calculability of the behaviour of physical and non-physical models with random parameters. They learn to construct diagram developments for specific models, both for Hamiltonian systems and non-equilibrium differential equations. They understand why physical laws describing the behaviour of non-ordered systems are often times simpler and how a new order arises from disorder. They learn to differentiate between quantum mechanical uncertainty and random uncertainty as well as between disorder and chaos.						
Courses (type, number of weekly contact hours, language — if other than German)						
V + R (no information on SWS (weekly contact hours) and course language available)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.						

Language of assessment: German, English

Allocation of places

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Additional information

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Workload

|--|

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Physics (2010)

Master's degree (1 major) Physics (2011)

Master's degree (1 major) FOKUS Physics (2010)

Master's degree (1 major) FOKUS Physics (2011)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 143 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title			Abbreviation			
Topology in Solid State Physics					11-TFP-132-m01	
Module coordinator				Module offered by		
Managi	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade		-		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts	5				
The stu cal met	dents a hods n	are familiar with the theo ecessary for their descrip	ry of topological effeo otion and are able to a	ts in Solid-State Phy apply these methods	ysics. They know the mathemati- s to simple problems.	
Intende	ed leari	ning outcomes				
The stu cal met	dents a hods n	are familiar with the theo ecessary for their descrip	ry of topological effeo otion and are able to	ts in Solid-State Phy apply these methods	ysics. They know the mathemati- s to simple problems.	
Course	S (type, n	umber of weekly contact hours.	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	d of ass	essment (type, scope, langua)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
weeks) Assess and wil examin Langua	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.					
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	Workload					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Physics (2010)						
Master's degree (1 major) Physics (2011)						
Master's degree (1 major) Nanostructure Technology (2011)						
Master's degree (1 major) Nanostructure Technology (2010)						
Master's degree (1 major) FOKUS Physics (2010)						
Master's degree (1 major) FOKUS Physics (2011)						
Module title				Abbreviation		
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Topological Order					11-TOPO-132-m01	
Module	coordi	nator		Module offered by		
Managir	ng Dire	ctor of the Institute of A	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	d of grading	Only after succ. con	pl. of module(s)		
6	numer	ical grade				
Duration	n	Module level	Other prerequisites			
1 semes	ter	graduate				
Content	s					
In modern Solid-State Physics, the concept of topologically ordered phases plays an increasingly important role. These phases possess no order in the conventional sense of a broken symmetry, but are characterised by topo- logical quantum numbers. Examples of topological quantum numbers or phases include: 1) The fractional charge and statistics of quasiparticle excitation in quantum Hall fluids. 2) The fractional quantisation of spins in spin liquids and the accompanying split-up of spin and charge in anti- ferromagnets. 3) The topological anomalies of fractionally quantised systems on the torus (or generally on surfaces with gender go). 4) Majorana fermion states at the interfaces between topological superconductors and topologically trivial regi- ons. The lecture explains the fundamental concepts with the help of basic examples. Intended learning outcomes The students acquire in-depth knowledge of topological order in quantum condensates. Courses (type, number of weekly contact hours, language – if other than German) V + R (no information on SWS (weekly contact hours) and course language available) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and						
Allocatio	on of p	laces				
	P					
Addition	nal info	ormation				
Workloa	ıd					
Teaching	g cycle	9				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	appea	rs in				
Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)						
Master's with	h 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. iik - 2011	page 145 / 296

Module title					Abbreviation	
Density	/ Functi	ional Theory and the Pl	nysics of Oxide Hetero	structure	11-DFT-142-m01	
Module coordinator			Module offered by			
chairpe	erson o	f examination committe	e	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
The stu of dens prograr theory.	dents a sity fund nmes s	are familiar with the ph ctional theory. They are such as Wien2k or VASF	ysical values of oxide h able to model problen 9. They can make simpl	neterostructures and ns of Theoretical Phy e calculations with t	with the principles a sics with the help of he help of density fu	and methods ⁷ important Inctional
Intende	ed leari	ning outcomes				
The stu of dens prograr theory.	dents a sity fun nmes s	are familiar with the ph ctional theory. They are such as Wien2k or VASF	ysical values of oxide h able to model problen 9. They can make simpl	neterostructures and ns of Theoretical Phy e calculations with t	with the principles a sics with the help of he help of density fu	and methods [:] important inctional
Course	S (type, n	umber of weekly contact hours	, language — if other than Gei	man)		
V + D (r	no infor	mation on SWS (weekl	/ contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
(approx report ((approx Assessi and wil gulation Langua	(, 30 m (approx (, 30 m ment o l be an ns) 200 ge of a	inutes per candidate, fo a 8 to 10 pages, time to inutes) ffered: When and how nounced in due form u 99. ssessment: German, En	or modules with less the complete: approx. 1 to often assessment will h nder observance of Sec nglish	o an 4 ECTS credits ap 4 weeks) or d) pres- be offered depends o ction 32 ASPO (gener	oprox. 20 minutes) o entation/seminar pr on the method of ass ral academic and exa	r c) project esentation sessment amination re-
Allocal		Jaces				
 Additio	nal inf	ormation				
Auuitio						
Worklo	ad					
Teachir	ng cycl	е				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
Module	e appea	ars in				
Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2010)						
Master	's degr	ee (1 major) FOKUS Phy	sics (2011)			
Master's wi	ith 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 146 / 296

Master's with 1 major FOKUS Physics (2011)

Module title					Abbreviation
Field Th	neory i	n Solid State Physics			11-FTFK-112-m01
Module	coord	inator		Module offered by	
Managi and Ast	ng Dire trophys	ector of the Institute of Th sics	neoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anow.			
Conten	ts				
outline 1 Coher 2 The fu 3 Pertur 4 Order 5 Green 6 The La 7 Furthe	could rent sta inction rbation param l's func andau er deve	tes and review of second tes and review of second tal integral formalism at f theory at T=0 teters and broken symme tions theory of Fermi liquids lopments	d quantization inite temperatures T etry		a or functional integration. An
Intende	ed lear	ning outcomes	-		
The stup	dents l acquir	have mastered the princi ed methods to current pr	ples of quantum field oblems of Theoretica	l theory in many-part l Solid-State Physics	cicle systems. They are able to ap-
Courses	S (type, r	number of weekly contact hours,	anguage — if other than Ger	man)	
V + R (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)
Method module is	l of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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					
Allocation of places					
Additio	nal inf	ormation			
Worklo	ad				

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Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 148 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title				Abbreviation		
Current	Current Topics of Theoretical Physics				11-EXT6A-112-m01	
Module	coord	inator		Module offered by		
chairpe	rson o	examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Approval by examination	ation committee requ	uired.	
Conten	ts					
Current study a	topics broad.	of Theoretical Physics. A	ccredited academic a	achievements, e.g. ir	n case of change of university or	
Intende	ed learr	ning outcomes				
The stu sics of t sics and of Theo	dents ł the Ma d have retical	nave advanced competer ster's programme. They h mastered the required m Physics.	ncies corresponding t have advanced specia ethods. They are able	o the requirements o alist knowledge of a e to apply the acquir	of a module of Theoretical Phy- subdiscipline of Theoretical Phy- ed methods to current problems	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte in grou c) proje (approx Langua	en exar ps (app ect repo k. 30 m ge of a	nination (approx. 120 mi prox. 30 minutes per cano prt (approx. 8 to 10 pages inutes) ssessment: German, Eng	nutes) or b) oral exan lidate, for modules w , time to complete: 1 lish	nination of one cand ith less than 4 ECTS to 4 weeks) or d) pre	idate each or oral examination credits approx. 20 minutes) or esentation/seminar presentation	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	9				
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
Module	appea	rs in				
Master'	s degre	ee (1 major) Physics (201	1)			
Master'	Master's degree (1 major) FOKUS Physics (2011)					

Module title				Abbreviation	
Current Topics in Physics					11-EXP6-111-mo1
Module	coord	inator		Module offered by	
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duration	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval by examination	ation committee req	uired.
Content	s				
Current change	topics of univ	of Experimental and The versity or study abroad.	oretical Physics. Accr	redited academic acl	hievements, e.g. in case of
Intende	d learr	ning outcomes			
The stuc Theoreti subdisc knowlec	dents ł ical Ph ipline dge. Th	nave advanced competer ysics of the Master's prop of Physics and understar ney are able to classify th	cies corresponding t gramme of Nanostruc Id the measuring and e subject-specific cor	o the requirements of ture Technology. The I/or calculation methes ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + R (no	o infor	mation on SWS (weekly o	ontact hours) and co	urse language availa	able)
Method module is	of ass creditab	s essment (type, scope, langua ₎ le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte less oth minutes prox. 8 t tes) Languag	en exar erwise 5 per ca to 10 p ge of a	mination (approx. 120 mi e specified) or b) oral exa andidate, for modules win ages, time to complete: a ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr t to 4 weeks) or d) pre lish	ith less than 4 ECTS lidate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- camination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-
Allocati	on of p	olaces			
Addition	nal inf	ormation			
Workloa	ad				
Teachin	g cycl	e			
Referred	Referred to in LPO I (examination regulations for teaching-degree programmes)				
Module	appea	ins in			
Master's Master's Master's Master's	Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)				



Astrophysics and Particle Physics (Theory)

(ECTS credits)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 151 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title					Abbreviation	
Astrophysics					11-A4-072-m01	
Module coordinator				Module offered by		
Managi and Ast	ing Dire trophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester undergraduate		Admission prerequi 50% of exercises. C sion to assessment ve details at the beg be considered a dec students have obtai over the course of th assessment into eff mitted to assessme assessment at a late for admission to assess	Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admis- sion to assessment. The lecturer will inform students about the respecti- ve 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 ad- mitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification			
Conten	ts					
nistery pes and stellar large-so nucleos Intende The stu physica ons. Th	d detec mediur cale str synthes ed learn dents a al obse ey kno	itors, stellar structure, s n, structure of the Milk ucture of the universe, sis, cosmic microwave ning outcomes are familiar with the mo rvations and evaluation w the structure of the u	stellar atmospheres, st y Way, local universe, e Friedmann World Mod background radiation, odern world view of Ast ns. They are able to use universe, e.g. of stars a	ellar evolution, final expanding space-tim els, thermodynamics structure formation, rophysics. They know e these methods to p nd galaxies and und	stages of stellar evo e, galaxies, active ga of the early univers inflation w methods and tools lan and analyse own erstand the process	s for astro- n observati- of their deve-
Course	s (type r	umber of weekly contact hour	s language — if other than Ge	rman)		
V + S (r	o infor	mation on SWS (weekl	v contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass	sessment (type, scope, lang	guage — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
written	exami	nation (approx. 120 mii	nutes)			
Allocat	ion of p	olaces				
Only as	part o	f pool of general key sk	kills (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	e				
 Deferre	d to in					
Reierre	KETEFFEG TO IN LFU I (examination regulations for teaching-degree programmes)					
Module	Module appears in					
Bachel	or' deg	ree (1 maior) Physics (2	2007)			
Master's wi	ith 1 major	r FOKUS Physics (2011)	JMU Würzburg	• generated 26-Aug-2024 • (Master (120 FCTS) FOKUS Phys	exam. reg.	page 152 / 296





Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Bachelor' degree (1 major) Aerospace Computer Science (2011) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Module title				Abbreviation		
Cosmology					11-AKM-092-m01	
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of T sics	heoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Content	ts		_			
Expand matter, and gal	ing spa primor axy clu	ace-time, Friedmannian rdial nucleosynthesis, c sters, intergalactic med	cosmology, basics of osmic microwave back lium, cosmological pa	general relativity, the ground, structure fo rameters	e early universe, infl rmation, superclust	ation, dark er, galaxies
Intende	d learr	ning outcomes				
The stu le to rel scientif	dents ł ate the ic ques	nave basic knowledge o em to observations. The stions.	f cosmology. They kno y have gained insights	w the theoretical me into current researc	ethods of cosmology h topics and are abl	and are ab- e to work on
Courses	5 (type, n	umber of weekly contact hours,	, language — if other than Ger	rman)		
R + V (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	s essment (type, scope, langu le for bonus)	age — if other than German, o	examination offered — if no	t every semester, informati	ion on whether
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.						amination in nutes) or c) esentation sessment demic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad		_			
			_			
Teachin	Teaching cycle					
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	mmes)		
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	ik - 2011	page 154 / 296



Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 155 / 296
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Module title					Abbreviation		
Plasma	-Astro	physics			11-APL-092-m01		
Module	coord	inator		Module offered by			
Managi and Ast	ng Dire rophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for					
Conten	ts						
Plasma getic pa acceler galaxie	Astrop articles ation v s and c	hysics: Dynamics of cha . Properties of magnetic to ia shock waves and via in other cosmic objects.	rged particles in elec turbulence. Propagat nteraction with plasm	tric and magnetic fie ion of solar particles na turbulence. Particl	lds. Transport equations for ener- within the solar wind. Particle le acceleration and transport in		
The stu	donte l	ning buccomes	Plasma Astronhysics	They have mastered	d the theoretical description of		
motion compar	and ac	celeration of charged pa evaluate theory and expe	rticles in space, they riments.	know corresponding	g measuring methods and can		
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)			
R + V (n	o infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)		
Methoo module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether		
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.							
Allocat	ion of p	olaces					
Additional information							
Worklo	Workload						
Teachir	Teaching cycle						



Module appears in

Module title					Abbreviation	
Introduction to Space Physics					11-ASP-092-m01	
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire trophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts					
1. Overview 2. Dynamics of charged particles in magnetic and electric fields 3. Elements of space physics 4. The sun and heliosphere 5. Acceleration and transport of energetic particles in the heliosphere 6. Instruments to measure energetic particles in extraterrestrial space Intended learning outcomes The students have basic knowledge of Space Physics, in particular of the characterisation of the dynamics of charged particles in space and in the heliosphere. They know relevant parameters, theoretical concepts and measuring methods. Courses (type, number of weekly contact hours, language – if other than German) R + V (no information on SWS (weekly contact hours) and course language available)						
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 Allocation of places						
 Additional information						
Workload						
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Aaster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 158 / 296

Teaching cycle

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Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 159 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title			Abbreviation			
Introduction to Plasmaphysics				11-EPP-092-m01		
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. If dents have obtained the qualification for admission to assessme the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. sessment at a later date, students will have to obtain the qualific			as- tive details Il be con- nt. If stu- soment over tion for as- Il be admit- ster. For as- alification for
Conten	ts					
Plasma Transpo thin the celerati	Astrop ort equa solar on and	hysics: Dynamics of ch ations for energetic par wind, Particle accelerat I transport in galaxies a	narged particles in elect ticles, Properties of ma ion via shock waves ar and other astrophysical	tric and magnetic fie agnetic turbulence, P nd via interaction wit objects, Cosmic rad	lds, Magnetohydrod Propagation of solar h plasma turbulence iation.	ynamics, oarticles wi- e, Particle ac-
Intende	ed learn	ning outcomes				
The stu ma. The	dents l ey are a	know the principles of I able to solve basic prob	Plasma Physics, especi lems of Plasma Physic	ally the description of a sand to apply this k	of transport phenom nowledge to Astroph	ena in plas- iysics.
Course	S (type, n	umber of weekly contact hours	s, language — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly	y contact hours) and co	urse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, lang le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
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.						
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	mmes)		
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	xam. reg. ik - 2011	page 160 / 296





Module appears in Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) Computational Mathematics (2012)

Module	title				Abbreviation	
Group Theory				11-GRT-092-m01		
Module coordinator			Module offered by			
Managi and Ast	ng Dire rophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Certain prerequisites must be met to qualify for admission to sessment. The lecturer will inform students about the respect at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assessment dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registrat sessment into effect. Students who meet all prerequisites will ted to assessment in the current or in the subsequent semest sessment at a later date, students will have to obtain the qua) as- tive details Il be con- nt. If stu- ssment over tion for as- ill be admit- ster. For as- alification for	
Conten	ts					
Group t	heory.	Finite groups. Lie grou	os. Lie algebra. Depicti	on. Tensors. Classifi	cation theorem. App	lications.
Intende	ed learr	ning outcomes				
The stug group tl lation a	dents l heory a nd pro	know the basics of grou and to solve them by us cessing of physical pro	p theory, especially of ing the acquired meth blems.	Lie groups. They are ods. They are able to	able to identify prol apply group theory	olems of to the formu-
Courses	5 (type, n	umber of weekly contact hour	, language — if other than Ge	rman)		
R + V (n	o infor	mation on SWS (weekl	/ contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	e ssment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
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.					amination in nutes) or c) esentation sessment demic and	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
			-			
Workload						
Teaching cycle						
KETERTRED TO IN LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's wit	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Aaster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 162 / 296



Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)
Master's degree (1 major) Computational Mathematics (2012)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 163 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module	Module title				Abbreviation	
Compu	Computational Astrophysics 11-NMA-111-m01					
Module	e coord	inator		Module offered by		
Managi and Ast	ing Dire trophys	ector of the Institute of T sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			as- tive details ll be con- nt. If stu- ssment over tion for as- til be admit- ster. For as- alification for	
Conten	ts					
rithms Lattice- ENO). N CL). Intende	(tree- a Boltzm Aethod ed learn	nd polynomial codes). aann). Hyperbolic conse s of high-performance o ning outcomes	Particle-mesh method: rvation laws (fluid dyn computing. Message-p	s (particle-in-cell met amics, finite differer assing interface (MP	thods). Vlasow meth nce method, Rieman I). GPGPU programm	iods (e.g., n solver, ning (Open-
The stu sics wit proach	dents a h the h such p	are able to solve typical help of numerical simula roblems and of validati	problems and equations. They are especing the results.	ons of Astrophysics a ially capable of choo	nd other subdiscipli sing adequate strate	ines of Phy- egies to ap-
Course	S (type, n	umber of weekly contact hours	, language — if other than Gei	rman)		
V + R (n	io infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
Methoo module is	d of ass creditab	s essment (type, scope, langu le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
a) written examination (approx. 120 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes) Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009. Language of assessment: German, English					(amination Iplete: 1 to 4 Sessment demic and	
Allocat	ion of p	olaces				
Additional information						
Workload						
Teaching cycle						
Master's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. reg. page 164 data record Master (120 ECTS) FOKUS Physik - 2011 page 164					page 164 / 296	

Module appears in

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Mathematical Physics (2012)

Master's degree (1 major) Mathematics (2012)

Master's degree (1 major) Physics (2011)

Master's degree (1 major) Mathematical Physics (2012)

Master's degree (1 major) FOKUS Physics (2011)

Master's degree (1 major) Computational Mathematics (2012)

Module title			Abbreviation			
Quantum Field Theory II				11-QFT2-092-m01		
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of ⁻ ics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective deta at the beginning of the course. Registration for the course will be con sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment o the course of the semester, the lecturer will put their registration for a sessment into effect. Students who meet all prerequisites will be adr ted to assessment in the current or in the subsequent semester. For a sessment at a later date, students will have to obtain the qualification admission to accessment anow.) as- tive details Il be con- nt. If stu- ssment over tion for as- ill be admit- ster. For as- alification for	
Conten	ts					
Quantu theories	m field s. Spor	theory II. Generating fu itaneous symmetry bre	unctionals. Path integra aking. Effective field th	al. Renormalisation. eory (optional).	Renormalisation gro	up. Gauge
Intende	ed learr	ning outcomes				
The stured the problem	dents ł princip ns of q	nave advanced knowled oles, especially of renor uantum field theory by	dge of the methods and malisation and gauge using the acquired cal	d concepts of quantu theories. They are ab culation methods.	Im field theory. They ble to formulate and	have maste- solve simple
Courses	S (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
R + V (n	o infor	mation on SWS (weekly	v contact hours) and co	urse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, lang le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
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.					amination in nutes) or c) esentation sessment demic and	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	xam. reg. ik - 2011	page 166 / 296



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

Master's with 1 major FOKUS Physics (2011)

Module title			Abbreviation		
Supers	ymmet	ry I and II			11-SUS-092-m01
Module	coord	inator		Module offered by	
Managi and Ast	ng Dire trophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Certain prerequisites must be met to qualify for admission to a sessment. The lecturer will inform students about the respectiv at the beginning of the course. Registration for the course will b sidered a declaration of will to seek admission to assessment. dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registratic sessment into effect. Students who meet all prerequisites will ted to assessment in the current or in the subsequent semeste sessment at a later date, students will have to obtain the quali		alify for admission to as- nts about the respective details ion for the course will be con- ission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for
Conten	ts				
Supersy persym Supersy ticles. F	ymmet metry: ymmet Phenon	ry I: Grassmann variable. Algebra and multiplets. S ry II: Minimal supersymm nenology of LEP, Tevatror	Coleman-Mandula th Superfield formalism netric standard model n and LHC, supersym	neorem and Haag-Lo . Breaking of supersy l. Higgs sector. The s metric neutrino mass	puszanski-Sohnius theorem. Su- ummetry. pectrum of supersymmetric par- s models. Violation of R-parity.
Intende	ed learı	ning outcomes			
The stu tric moo importa	dents I dels. Th ance fo	have knowledge of the m ney understand the theor r phenomenology of elen	athematical and phys y's formalism and red nentary particles.	sical principles of su cognise its connectio	persymmetry and supersymme- ons to other models as well as its
Courses	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)
Method module is	l of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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.					
Allocation of places					
Additional information					
Worklo	ad				
Teaching cycle					

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Module appears in

Module	e title				Abbreviation
Renorm	Renormalization Theory 11-RNT-092-m01				
Module	e coord	inator		Module offered by	
Managi and Ast	ing Dire trophys	ector of the Institute of Th sics	neoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites	i	
1 semester graduate		Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification fo			
Conten	ts				
behavio levance ons. Sto berg-Ma and cor	our for e for ph ochast a diffei mparis ed lear	dynamics beyond the eq ase diagrams in cryogen ic non-linear partial diffe rential equations. Symme on of different RG metho ning outcomes	uilibrium. Classical-c ic temperatures. Inst rential equations. Co etries, e.g. in the stoc ds.	ritical and quantum- ability of statistical a nstruction of generat hastic Burgers' equa	critical phenomena and their re- and dynamic mean-field soluti- ting functionals. Halperin-Hohen- ation (KPZ equation). Introduction
The stu	dents	have gained an overview	of renormalisation g	roup methods for no	n-linear partial differential equa-
tions. T tasks.	hey kn	ow important examples	and corresponding sc	olving methods and a	are able to apply them to specific
Course	S (type, r	number of weekly contact hours,	language — if other than Ge	rman)	
R + V (n	io infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)
Methoo module is	d of ass creditab	Sessment (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	t every semester, information on whether
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.					
Allocation of places					
Additio	Additional information				
Worklo	ad				

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's with 1 major FOKUS Physics (2011)

Module title			Abbreviation		
Relativistical Quantumfield Theory			11-RQFT-092-m01		
Module coordinator Module of			Module offered by		
Managi and Ast	ng Dire trophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semestergraduateCertain prerequisites must be met to qualify for admission to as sessment. The lecturer will inform students about the respectiv at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester sessment at a later date, students will have to obtain the qualification.		alify for admission to as- nts about the respective details ion for the course will be con- ission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for			
Conten	ts				
Symme theory. normali	tries. L Feynm isation	agrange formalism for fie an rules. Quantum electr	elds. Field quantisatio odynamic processes	on. Gauge principle a in Born approximation	nd interaction. Perturbation on. Radiative corrections and re-
Intende	ed lear	ning outcomes			
The stu They kn process standin	dents l Iow ho Ses in t Ig of ra	have mastered the princi w to use perturbation the he framework of quantur diative corrections and re	ples and underlying r ory and how to apply n electrodynamics in enormalisation.	nathematics of relati / Feynman rules. The leading order. Mored	vistic quantum field theories. y are able to calculate basics over, they have a basic under-
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
R + V (n	o infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)
Methoo module is	of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether
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.					
Allocati	ion of r	blaces			
Additional information					
Workload					
Teaching cycle					

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Module appears in

Module title			Abbreviation			
Theory of Relativity				11-RTT-092-m01		
Module	coord	inator		Module offered by		
Managing Director of the Institute of Theoreti and Astrophysics		Theoretical Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. If dents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. sessment at a later date, students will have to obtain the qualification for the semester.) as- tive details Il be con- nt. If stu- ssment over ition for as- ill be admit- ster. For as- alification for
Conten	ts		1			
Mathen ments o general	natical of differ relativ	foundations of the the rential geometry; electr ity; stellar models; intr	ory of relativity; differe odynamics as an exam oduction to cosmology	ntial forms; brief sun ple of a relativistic g ; Hamiltonian formu	nmary of special rela auge theory; field ec lation	itivity; ele- quations of
Intende	d learr	ning outcomes				
The stue mathen able to	dents a natical apply t	are familiar with the bas understanding of the fo he acquired knowledge	sic physical and mathe ormulation of general r e to problems of Astrop	matical concepts of elativity on the basis physics and cosmolo	general relativity. Th s of differential forms gy.	ey have a s. They are
Courses	5 (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
R + V (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether
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.					amination in nutes) or c) esentation sessment demic and	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. .ik - 2011	page 174 / 296



Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 175 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title					Abbreviation	
Theoretical Elementary Particle Physics					11-TEP-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Th and Astrophysics			eoretical Physics	Faculty of Physics and Astronomy		
ECTS Method of grading Or		Only after succ. con	Inly after succ. compl. of module(s)			
8 numerical grade						
Duration		Module level	Other prerequisites			
1 semester		graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	ts		I			
Fundamental forces and particles. Groups and symmetries. Quark model. Principles of quantum field theory. Gauge theories. Spontaneous symmetry breaking. Electroweak standard model. Quantum chrome dynamics. Ex- tensions of the standard model.						
Intende	ed lear	ning outcomes				
The students are familiar with the mathematical methods of Elementary Particle Physics. They understand the structure of the standard model based on symmetry principles and experimental observations. They know calculation methods for the processing of simple problems and processes of Elementary Particle Physics. Furthermore, they know the tests and limits of the standard model and the basics of extended theories.						
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	rman)		
R + V (n	io infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether	
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						
Allocation of places						
Additional information						
Workload						
Teachir	ıg cycl	е				



Module appears in

Module title				Abbreviation		
Particle Physics (Standard Model)					11-TPS-092-m01	
Module	coord	inator		Module offered by		
Managing Directors of the Institute of A the Institute of A the Institute of Theoretical Physics and			Applied Physics and d Astrophysics	Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester		graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Content	ts		-			
Introdu standar	ction to d mod	the theory of electrow el and determination of	eak interaction and sp model parameters.	ontaneous symmetry	y breaking. Experime	ents on the
Intende	d learr	ning outcomes				
The students know the theoretical fundamental laws of the standard model of Particle Physics and the key ex- periments that have established and confirmed the standard model. They are able to interpret experimental or theoretical results in the framework of the standard model and know its validity and limits.						
Courses	5 (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
R + V (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, langu le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	ion on whether
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						
Allocation of places						
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's wit	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	 generated 26-Aug-2024 easter (120 ECTS) FOKUS Physical PhysicaPhysical Physi	exam. reg. iik - 2011	page 178 / 296



Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 179 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title				Abbreviation		
Theoretical Astrophysics					11-AST-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Theoretical Physics and Astrophysics			eoretical Physics	Faculty of Physics and Astronomy		
ECTS Method of grading		Only after succ. compl. of module(s)				
6	nume	rical grade				
Duration Module		Module level	Other prerequisites			
1 semester		graduate				
Conten	Its					
Theore	tical As	trophysics, models for th	e description of com	plex observation res	ults, numeric simulations.	
Intend	ed lear	ning outcomes				
The stu observ	udents l ations a	have basic knowledge of and to test the models wi	the methods of Theo th the help of simula	retical Astrophysics. tions.	They are able to design complex	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)						
written	exami	nation (approx. 120 minu	tes)			
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Workload						
Teaching cycle						
Referre	ed to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
		•				
Module appears in						
Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012)						
Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Mathematical Physics (2000)						
Bachelor' degree (1 major) Mathematical Physics (2009)						
Master's degree (1 major) Physics (2010)						
Master's degree (1 major) Physics (2011)						
Master's degree (1 major) Mathematical Physics (2012)						
Master's degree (1 major) FOKUS Physics (2010)						
Master's degree (1 major) FOKUS Physics (2011)						
Master's degree (1 major) FUKUS Physics (2006)						
Module title			Abbreviation			
---	---	---	---	--	--	---
Introduction to Elementary Particle Theory				11-ETT-111-m01		
Module coordinator Module offer				Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of ⁻ sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateCertain prerequisites must be met to qualify for admission to sessment. The lecturer will inform students about the respect at the beginning of the course. Registration for the course wi sidered a declaration of will to seek admission to assessment dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites wi ted to assessment at a later date, students will have to obtain the qualification.) as- tive details ll be con- nt. If stu- ssment over tion for as- ill be admit- ster. For as- alification for				
Conten	ts					
Symme dynami	tries in cs and	Particle Physics. Quarl in the standard model.	k model of hadrons. Fe Parton model and dee	ynman rules. Simple ep inelastic lepton-n	processes in quant ucleon scattering.	um electro-
Intende	ed learı	ning outcomes				
The stu	dents l	nave in-depth knowledរ្	ge of Theoretical Eleme	entary Particle Physic	.s.	
Courses	5 (type, n	umber of weekly contact hours	, language — if other than Gei	man)		
V (no in	format	ion on SWS (weekly co	ntact hours) and cours	e language available	2)	
Method module is	l of ass creditab	essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
a) writte groups project (approx Assessi and wil examin Langua	en exar (appro report 3. 30 m ment o l be an ation r ge of a	mination (approx. 90 m x. 30 minutes per cand (approx. 8 to 10 pages, inutes) ffered: When and how o nounced in due form u egulations) 2009. ssessment: German, Er	inutes) or b) oral exam idate, for modules with time to complete: 1 to often assessment will h nder observance of Sec nglish	ination of one candi h less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection	date each or oral exa edits approx. 20 mir entation/seminar pre on the method of ase 3 ASPO (general aca	amination in outes) or c) esentation sessment demic and
Allocati	ion of p	olaces	<u> </u>			
	•					
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ıg cycl	8				
Referre	d to in	LPOI (examination regulation	ons for teaching-degree progra	mmes)		
Module	appea	irs in				
Master'	s degr	ee (1 major) Physics (2c	910)			
Master's wi	th 1 majoı	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 laster (120 ECTS) FOKUS Phys	exam. reg. ;ik - 2011	page 181 / 296

Julius-Maximilians-UNIVERSITÄT WÜRZBURG



Master's degree (1 major) Physics (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module title				Abbreviation		
Quantum Loop Gravity				11-QSG-102-m01		
Module coordinator			Module offered by			
Managi and Ast	ng Dire rophys	ector of the Institute of ⁻ sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateCertain prerequisites must be met to qualify for admission to sessment. The lecturer will inform students about the respect at the beginning of the course. Registration for the course will sidered a declaration of will to seek admission to assessmed dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registric sessment into effect. Students who meet all prerequisites wited to assessment in the current or in the subsequent seme sessment at a later date, students will have to obtain the quality of the semester.		alify for admission to nts about the respec- ion for the course wi nission to assessmen r admission to asses will put their registra t all prerequisites w e subsequent semes ave to obtain the qu	o as- ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for			
Conten	ts					
Aside fr chanica bles are on disc Therefo Intende The stu ted topi Courses V + S (n Method module is a) writte b) oral 6 module is a) writte d) prese Langua Assessi and wil examin	om str al descr e identi retised re, QLC ed learr dents l ic and s (type, n o infor l of ass creditab en exar examin s with ct repo entatio ge of a ment o l be an ation r	ing theory, quantum loo ription of gravity. Gener fied with the correspor graphs, so-called spin belongs to the specul ning outcomes know the principles of of have proved their know umber of weekly contact hours mation on SWS (weekly ressment (type, scope, lang le for bonus) mination (approx. 90 m ation of one candidate less than 4 ECTS credit ort (approx. 8 to 10 page n/seminar presentation ssessment: German, Er ffered: When and how of nounced in due form un egulations) 2009.	op gravity (QLG) is one ral relativity is formulat ding Poisson brackets networks. In doing so, ative theories which pa quantum loop gravity. T dedge in a seminar pre s, language – if other than Ger y contact hours) and co uage – if other than German, inutes) or each or oral examinat s approx. 20 minutes) es, time to complete: 1 n (approx. 30 minutes) nglish often assessment will I nder observance of Sec	of the most importance ed in Hamiltonian fo . These variables are e.g. a quantisation of aint a picture of the of They have acquired a sentation. man) ourse language availate examination offered — if no to n in groups (approxion to 4 weeks) or to 6 offered depends of ction 32 Subsection 3	nt approaches to a commalism and the electromalism and the electromatised in the typof elemental volume constitution of space downced knowledge able) tevery semester, information of the method of assay a SPO (general aca	uantum me- mental varia- pical manner es appears. e and time. e of a selec- ion on whether ndidate, for sessment demic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ig cycl	9				
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record M	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 183 / 296

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module title			Abbreviation			
Modern Astrophysics				11-MAS-111-m01		
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of ⁻ sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateCertain prerequisites must be met to qualify for admission sessment. The lecturer will inform students about the resp at the beginning of the course. Registration for the course sidered a declaration of will to seek admission to assess dents have obtained the qualification for admission to ass the course of the semester, the lecturer will put their regist sessment into effect. Students who meet all prerequisites ted to assessment in the current or in the subsequent sem sessment at a later date, students will have to obtain the current		alify for admission to nts about the respec- ion for the course wi hission to assessme r admission to asses will put their registra t all prerequisites w e subsequent semes ave to obtain the qu	o as- tive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for			
Conten	ts					
Introdu	ction to	o a field of modern Astr	ophysics, e.g. extra-ga	lactic jets.		
Intende	d learr	ning outcomes				
The stu- lues an observa	dents d are to ational	know the current state of plan and conduct obs project and e.g. to app	of research on the mod ervations in this area. ly for observation time	lern topic of Astrophy This includes the ab at large telescopes.	ysics. They know the ility to conceptualise	e physical va- e a specific
Courses	5 (type, n	umber of weekly contact hours	, language — if other than Ge	rman)		
V + R (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	e essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
a) writte groups project (approx Assessi and will examin Langua	en exar (appro report 3. 30 m ment o l be an ation ro ge of a	nination (approx. 90 m x. 30 minutes per cand (approx. 8 to 10 pages, inutes) ffered: When and how o nounced in due form u egulations) 2009. ssessment: German, Er	inutes) or b) oral exam idate, for modules with time to complete: 1 to often assessment will h nder observance of Sec glish	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection 3	date each or oral ex edits approx. 20 mir entation/seminar pro on the method of as 3 ASPO (general aca	amination in nutes) or c) esentation sessment demic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachin	ig cycl	e				
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	immes)		
Module	appea	in in				
Master's wit	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 185 / 296



Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module title			Abbreviation			
Concepts of Theoretical Astroparticle physics				11-ATT-111-m01		
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of T sics	heoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semestergraduateCertain prerequisites must be met to qualify for admiss sessment. The lecturer will inform students about the at the beginning of the course. Registration for the coursidered a declaration of will to seek admission to asso dents have obtained the qualification for admission to the course of the semester, the lecturer will put their r sessment into effect. Students who meet all prerequisi ted to assessment in the current or in the subsequent sessment at a later date, students will have to obtain		alify for admission to nts about the respec- ion for the course wi hission to assessment r admission to asses will put their registrate t all prerequisites we e subsequent semest ave to obtain the qu	o as- ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for			
Conten	ts					
Concep mic acc	ts of Th elerato	neoretical Astro-Particle ors, dark energy, inflatic	Physics, e.g. Dark ma m.	tter, cosmic radiatio	n, neutrinos, baryog	enesis, cos-
Intende	ed learr	ning outcomes				
The stu be pher proache	dents h nomen es for p	nave basic knowledge o a of Astroparticle Physio problems.	f the concepts of Thec cs on the basis of meth	pretical Astroparticle hods of Theoretical P	Physics. They are ab hysics and to find so	ole to descri- olution ap-
Courses	S (type, n	umber of weekly contact hours	, language — if other than Ger	rman)		
V + R (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Method module is	l of ass creditab	essment (type, scope, langule for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
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					amination in nutes) or c) esentation sessment demic and	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
			_			
Worklo	ad					
 Taashir		-	_			
reachir	ig cycl	e				
Referre	d to in	LPOI (examination regulation	ns for teaching-degree progra	ammes)		
				·,		
Module	appea	irs in				
Mastoricuit	th 1 maio	FOKUS Physics (2014)	IMIT Missie	• generated of Aug approx	avam reg	nare 197 / 201
master 5 WI	in i major	1 0100 F Hysics (2011)	data record N	Master (120 ECTS) FOKUS Phys	sik - 2011	hage 10/ / 290



Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module title					Abbreviation	
General Theory of Relativity				11-ART-112-m01		
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of T lics	heoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate Certain prerequisites must be met to qualify for admiss sessment. The lecturer will inform students about the r at the beginning of the course. Registration for the cours idered a declaration of will to seek admission to asse dents have obtained the qualification for admission to the course of the semester, the lecturer will put their re sessment into effect. Students who meet all prerequisi ted to assessment in the current or in the subsequent sessment at a later date, students will have to obtain to		alify for admission to nts about the respec- ion for the course wi ission to assessmer r admission to asses will put their registra t all prerequisites wi e subsequent semes ave to obtain the qua	o as- ctive details Il be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for			
Conten	ts					
Mathen ments o general	natical of diffe relativ	foundations of the theo rential geometry; electro ity; stellar models; intro	ory of relativity; different odynamics as an exam oduction to cosmology	ntial forms; brief sun ple of a relativistic g ; Hamiltonian formu	nmary of special rela auge theory; field ec lation	ntivity; ele- quations of
Intende	d learr	ning outcomes				
The stu mathen able to	dents a natical apply t	are familiar with the bas understanding of the fo he acquired knowledge	ic physical and mathe prmulation of general r to problems of Astrop	matical concepts of elativity on the basis hysics and cosmolo	general relativity. Th of differential forms gy.	iey have a s. They are
Courses	5 (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly	contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, langu le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
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					amination in nutes) or c) esentation sessment demic and	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad		_			
Teachir	ıg cycl	9				
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	mmes)		
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	xam. reg. ik - 2011	page 189 / 296



Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module title Abbreviation						
Special Theory of Relativity				11-SRT-112-m01		
Module	coord	inator		Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of sics	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i		
1 semester graduate Certain prerequisi sessment. The lea at the beginning of sidered a declarat dents have obtain the course of the sessment into efficient ted to assessment sessment at a late		Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to assess	tain prerequisites must be met to qualify for admission to as- issment. The lecturer will inform students about the respective details the beginning of the course. Registration for the course will be con- ered a declaration of will to seek admission to assessment. If stu- nts have obtained the qualification for admission to assessment over a course of the semester, the lecturer will put their registration for as- issment into effect. Students who meet all prerequisites will be admit- to assessment in the current or in the subsequent semester. For as- issment at a later date, students will have to obtain the qualification for			
Conten	ts					
Mathen nian eq	natical uation	principles; differential of motion; relativistic f	forms; special relativit ree particle	y; Minkowski space;	Lorentz transformat	tion, Hamilto-
Intende	ed leari	ning outcomes				
The stu familiar ge to pr	dents a with n oblem	are familiar with the ph nodern mathematical fo s of special relativity.do	ysical concepts and ma ormulation of special re	athematical principle elativity. They are ab	es of special relativit le to apply the acqui	y. They are red knowled-
Courses	5 (type, n	umber of weekly contact hours	s, language — if other than Ge	rman)		
V + R (n	o infor	mation on SWS (weekly	/ contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	s essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
a) writte groups project (approx Assessi and wil examin	en exar (appro report x. 30 m ment o l be an ation re	mination (approx. 90 m x. 30 minutes per cand (approx. 8 to 10 pages, inutes) ffered: When and how nounced in due form u egulations) 2009.	inutes) or b) oral exam idate, for modules with time to complete: 1 to often assessment will I nder observance of Sec	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese be offered depends o ction 32 Subsection	date each or oral exa edits approx. 20 mir entation/seminar pre on the method of ass 3 ASPO (general aca	amination in nutes) or c) esentation sessment demic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)		
Module	appea	nrs in				
Master's wi	th 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 191 / 296



Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module	title				Abbreviation
Current Topics of Theoretical Physics 11-EXT6A-112-m				11-EXT6A-112-m01	
Module	coord	inator		Module offered by	
chairpe	rson o	examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Approval by examination	ation committee requ	uired.
Conten	ts				
Current study a	topics broad.	of Theoretical Physics. A	ccredited academic a	achievements, e.g. ir	n case of change of university or
Intende	ed learr	ning outcomes			
The stu sics of t sics and of Theo	dents ł the Ma d have retical	nave advanced competer ster's programme. They h mastered the required m Physics.	ncies corresponding t have advanced specia ethods. They are able	o the requirements o alist knowledge of a e to apply the acquir	of a module of Theoretical Phy- subdiscipline of Theoretical Phy- ed methods to current problems
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)
Methoo module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte in grou c) proje (approx Langua	en exar ps (app ect repo k. 30 m ge of a	nination (approx. 120 mi prox. 30 minutes per cano prt (approx. 8 to 10 pages inutes) ssessment: German, Eng	nutes) or b) oral exan lidate, for modules w , time to complete: 1 lish	nination of one cand ith less than 4 ECTS to 4 weeks) or d) pre	idate each or oral examination credits approx. 20 minutes) or esentation/seminar presentation
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	9			
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	rs in			
Master'	s degre	ee (1 major) Physics (201	1)		
Master's degree (1 major) FOKUS Physics (2011)					

Module title			Abbreviation		
Current	Topics	s in Physics			11-EXP6-111-m01
Module	coord	inator		Module offered by	
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval by examination	ation committee req	uired.
Content	ts				
Current change	topics of univ	of Experimental and The /ersity or study abroad.	oretical Physics. Accr	edited academic acl	hievements, e.g. in case of
Intende	d learr	ning outcomes			
The stud Theoret subdisc knowled	dents ł ical Ph tipline dge. Th	nave advanced competer ysics of the Master's prop of Physics and understar yey are able to classify th	ncies corresponding t gramme of Nanostruc nd the measuring and e subject-specific cor	o the requirements of ture Technology. The I/or calculation methet ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)
Method module is	l of ass creditab	e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte less oth minutes prox. 8 f tes) Languag	en exar ierwise 5 per ca to 10 p ge of a	nination (approx. 120 mi e specified) or b) oral exa andidate, for modules wi ages, time to complete: a ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr t to 4 weeks) or d) pre lish	ith less than 4 ECTS idate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- kamination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-
Allocati	on of p	olaces			
Additio	nal info	ormation			
Workloa	ad				
Teachin	ig cycl	e			
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)					



Complex Systems, Quantum Control and Biophysics (Theory)

(ECTS credits)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.
	data record Master (120 ECTS) FOKUS Physik - 2011

Module	title				Abbreviation
Physics of Complex Systems					11-PKS-092-m01
Module coordinator				Module offered by	
Managir and Astr	ng Dire rophys	ector of the Institute of Th ics	eoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	numei	rical grade			
Duratior	n	Module level	Other prerequisites		
1 semes	ter	graduate	Certain prerequisites must be met to qualify for admission to as sessment. The lecturer will inform students about the respectiv at the beginning of the course. Registration for the course will be sidered a declaration of will to seek admission to assessment. dents have obtained the qualification for admission to assess the course of the semester, the lecturer will put their registration sessment into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester sessment at a later date, students will have to obtain the quali		alify for admission to as- nts about the respective details ion for the course will be con- sission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for
Content	s				
1. Theory 2. Introd 3. Entrop 4. Phase 5. Unive 6. Spin § 7. Theor	y of cri luctior py pro- trans rsality glasse y of ne	tical phenomena in therr n into the physics out of e duction and fluctuations itions away from equilibr t st eural networks	nal equilibriumt equilibriumt t iumt		
Intende	d learr	ning outcomes			
The stud methods such sys	lents ł s of St stems.	nave specific and advanc atistical Physics, Comput They are able to work on	ed knowledge in the ational Physics and i current research pro	field of physics of co non-linear dynamics blems in this area.	omplex systems. They know the , which are used to describe
Courses	(type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
R + V (no	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)
Method module is a	of ass creditab	essment (type, scope, langua, le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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.				date each or oral examination in edits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and	
Allocatio	on of p	olaces			
Addition	nal info	ormation			
Workloa	ıd				

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Physics (2012) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2010)

Master's with 1 major FOKUS Physics (2011)

Module	e title				Abbreviation
Quantum Information and Quantum Computing				11-QIC-092-m01	
Module	e coord	inator		Module offered by	
Manag and As	ing Dire trophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective de at the beginning of the course. Registration for the course will be co- sidered a declaration of will to seek admission to assessment. If st dents have obtained the qualification for admission to assessment the course of the semester, the lecturer will put their registration for sessment into effect. Students who meet all prerequisites will be a ted to assessment in the current or in the subsequent semester. For sessment at a later date, students will have to obtain the qualificat		
Conten	ts				
The firs ses the entang tron sp states.	st part i main o led sta in state	ntroduces the theoretica quantum algorithms. The tes. One of the main topi es. The third part covers t	l concepts of quantur second part discusse cs is the production, he description and ex	n information and question and question and question of the second point of the second point of the second point of the second s	uantum computers. It discus- sibilities for the realisation of ipulation of coherent two-elec- erence of quantum mechanical
Intende	ed lear	ning outcomes			
The stu They ar	idents l re able	have an advanced unders to solve simple problems	standing of quantum s of quantum informa	theory and basic kno tion theory.	owledge of quantum calculation.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)
Method module is	d of ass s creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writt groups project (approx	en exai (appro report x. 30 m ment o	mination (approx. 90 mir x. 30 minutes per candid (approx. 8 to 10 pages, t inutes) ffered: When and how of	utes) or b) oral exam late, for modules with ime to complete: 1 to ten assessment will b	ination of one candi less than 4 ECTS cr 4 weeks) or d) prese pe offered depends of	date each or oral examination in edits approx. 20 minutes) or c) entation/seminar presentation
and will examin	ll be an ation r	nounced in due form und egulations) 2009.	der observance of Sec	ction 32 Subsection	3 ASPO (general academic and
	ion of r				
		Jaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachi	ng cycl	e			

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Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) Physics (2010)
Master's degree (1 major) Physics (2011)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) Mathematical Physics (2012)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
Master's degree (1 major) FOKUS Physics (2010)
Master's degree (1 major) FOKUS Physics (2011)

Module	title				Abbreviation
Current Topics in Physics				11-EXP6-111-mo1	
Module	coord	inator		Module offered by	
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
6	nume	rical grade			
Duration	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval by examination	ation committee req	uired.
Content	s				
Current change	topics of univ	of Experimental and The versity or study abroad.	oretical Physics. Accr	redited academic acl	hievements, e.g. in case of
Intende	d learr	ning outcomes			
The stuc Theoreti subdisc knowlec	dents ł ical Ph ipline dge. Th	nave advanced competer ysics of the Master's prop of Physics and understar ney are able to classify th	cies corresponding t gramme of Nanostruc Id the measuring and e subject-specific cor	o the requirements of ture Technology. The I/or calculation methes ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
V + R (no	o infor	mation on SWS (weekly o	ontact hours) and co	urse language availa	able)
Method module is	of ass creditab	s essment (type, scope, langua ₎ le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) writte less oth minutes prox. 8 t tes) Languag	en exar erwise 5 per ca to 10 p ge of a	mination (approx. 120 mi e specified) or b) oral exa andidate, for modules win ages, time to complete: a ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr t to 4 weeks) or d) pre lish	ith less than 4 ECTS lidate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- camination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-
Allocati	on of p	olaces			
Addition	nal inf	ormation			
Workloa	ad				
Teachin	g cycl	e			
Referred	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	ins in			
Master's Master's Master's Master's	Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)				

Module	title				Abbreviation		
Current	Current Topics of Theoretical Physics 11-EXT6A-112-mo1						
Module	coord	inator		Module offered by			
chairpe	rson o	examination committee		Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate	Approval by examination	ation committee requ	uired.		
Conten	ts						
Current study a	topics broad.	of Theoretical Physics. A	ccredited academic a	achievements, e.g. ir	n case of change of university or		
Intende	ed learr	ning outcomes					
The stu sics of t sics and of Theo	dents ł the Ma d have retical	nave advanced competer ster's programme. They h mastered the required m Physics.	ncies corresponding t have advanced specia ethods. They are able	o the requirements o alist knowledge of a e to apply the acquir	of a module of Theoretical Phy- subdiscipline of Theoretical Phy- ed methods to current problems		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)		
Methoo module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
a) writte in grou c) proje (approx Langua	en exar ps (app ect repo k. 30 m ge of a	nination (approx. 120 mi prox. 30 minutes per cano prt (approx. 8 to 10 pages inutes) ssessment: German, Eng	nutes) or b) oral exan lidate, for modules w , time to complete: 1 lish	nination of one cand ith less than 4 ECTS to 4 weeks) or d) pre	idate each or oral examination credits approx. 20 minutes) or esentation/seminar presentation		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Teachir	ng cycl	9					
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)			
Module	appea	rs in					
Master'	s degre	ee (1 major) Physics (201	1)				
Master'	Master's degree (1 major) FOKUS Physics (2011)						



Current Topics in Theoretical Physics

(ECTS credits)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 202 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title				Abbreviation		
Current Topics in Theoretical Physics					11-EXT5-111-m01	
Module	coord	inator		Module offered by		
chairpe	erson of	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Approval by examina	ation committee req	uired.	
Conten	ts					
Current study a	topics broad.	of Theoretical Physics. A	ccredited academic a	achievements, e.g. ir	n case of change of university or	
Intende	ed learr	ning outcomes				
The stu sics of t sics and of Theo	dents ł the Ma d have retical	nave advanced competer ster's programme. They h mastered the required m Physics.	ncies corresponding t have advanced specia ethods. They are able	o the requirements o alist knowledge of a e to apply the acquir	of a module of Theoretical Phy- subdiscipline of Theoretical Phy- ed methods to current problems	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	d of ass creditab	e ssment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte less oth minute prox. 8 tes) Langua	en exar nerwise s per ca to 10 p ge of a	nination (approx. 120 mi e specified) or b) oral exa andidate, for modules wi ages, time to complete: : ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr t to 4 weeks) or d) pre lish	ith less than 4 ECTS idate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- camination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	irs in				
Master	's degre	ee (1 major) Physics (201	o)			
Master	's degre	ee (1 major) Physics (201	1)			
Master	's degre	ee (1 major) FOKUS Physi	cs (2010)			
Master	s degre	ee (1 major) FOKUS Physi	CS (2011)			
master	Master's degree (1 major) FOKUS Physics (2006)					

Module title				Abbreviation		
Current Topics in Theoretical Physics					11-EXT6-111-m01	
Module	coord	inator		Module offered by		
chairpe	erson of	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Approval by examina	ation committee req	uired.	
Conten	ts					
Current study a	topics broad.	of Theoretical Physics. A	ccredited academic a	achievements, e.g. ir	n case of change of university or	
Intende	ed learr	ning outcomes				
The stu sics of t sics and of Theo	dents ł the Ma d have retical	nave advanced competer ster's programme. They h mastered the required m Physics.	ncies corresponding t nave advanced specia ethods. They are able	o the requirements o alist knowledge of a e to apply the acquir	of a module of Theoretical Phy- subdiscipline of Theoretical Phy- ed methods to current problems	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte less oth minute prox. 8 tes) Langua	en exar nerwise s per ca to 10 p ge of a	nination (approx. 120 mi e specified) or b) oral exa andidate, for modules wi ages, time to complete: s ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr 1 to 4 weeks) or d) pre lish	ith less than 4 ECTS idate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- camination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	irs in				
Master's degree (1 major) Physics (2010) Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)						
			-			

Module title				Abbreviation		
Current Topics in Theoretical Physics 11-EXT7-111-m01				11-EXT7-111-m01		
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
7	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Approval by examina	ation committee req	uired.	
Conten	ts					
Current study a	topics broad.	of Theoretical Physics. A	ccredited academic a	achievements, e.g. ir	n case of change of university or	
Intende	ed learı	ning outcomes				
The stu sics of t sics and of Theo	dents l the Ma d have retical	nave advanced competer ster's programme. They h mastered the required m Physics.	ncies corresponding t ave advanced specia ethods. They are able	o the requirements o alist knowledge of a e to apply the acquir	of a module of Theoretical Phy- subdiscipline of Theoretical Phy- red methods to current problems	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte less oth minute prox. 8 tes) Langua	en exar nerwise s per ca to 10 p ge of a	nination (approx. 120 mi e specified) or b) oral exa andidate, for modules wi ages, time to complete: ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr t to 4 weeks) or d) pre lish	ith less than 4 ECTS idate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- kamination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	urs in				
Master	's degr	ee (1 major) Physics (201	o)			
Master	's degr	ee (1 major) Physics (201	1)			
Master	's degr	ee (1 major) FOKUS Physi	cs (2010)			
Master	s degr	ee (1 major) FOKUS Physi	CS (2011)			
master	Master's degree (1 major) FOKUS Physics (2006)					

Module title				Abbreviation		
Current Topics in Theoretical Physics					11-EXT8-111-m01	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current study a	topics broad.	of Theoretical Physics. A	ccredited academic a	achievements, e.g. ir	n case of change of university or	
Intende	ed learı	ning outcomes				
The stu sics of t sics and of Theo	dents l the Ma d have retical	nave advanced competer ster's programme. They h mastered the required m Physics.	ncies corresponding t nave advanced specia ethods. They are able	o the requirements o alist knowledge of a e to apply the acquir	of a module of Theoretical Phy- subdiscipline of Theoretical Phy- red methods to current problems	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Methoo module is	d of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte less oth minute prox. 8 tes) Langua	en exar nerwise s per ca to 10 p ge of a	nination (approx. 120 mi e specified) or b) oral exa andidate, for modules wi ages, time to complete: ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr 1 to 4 weeks) or d) pre lish	ith less than 4 ECTS idate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- camination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	nrs in				
Master	's degr	ee (1 major) Physics (201	0)			
Master	's degr	ee (1 major) Physics (201	1)			
Master	's degr	ee (1 major) FOKUS Physi	cs (2010)			
Master	s degr	ee (1 major) FOKUS Physi	CS (2011)			
master	Master's degree (1 major) FOKUS Physics (2006)					

Module title				Abbreviation		
Current Topics in Physics					11-EXP6-111-m01	
Module	coord	inator		Module offered by		
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Approval by examination	ation committee req	uired.	
Content	ts					
Current change	topics of univ	of Experimental and The /ersity or study abroad.	oretical Physics. Accr	edited academic acl	hievements, e.g. in case of	
Intende	d learr	ning outcomes				
The stud Theoret subdisc knowled	dents ł ical Ph tipline dge. Th	nave advanced competer ysics of the Master's prop of Physics and understar yey are able to classify th	ncies corresponding t gramme of Nanostruc nd the measuring and e subject-specific cor	o the requirements of ture Technology. The I/or calculation methet ntexts and know the	of a module of Experimental or ey have knowledge of a current nods necessary to acquire this application areas.	
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte less oth minutes prox. 8 f tes) Languag	en exar ierwise 5 per ca to 10 p ge of a	nination (approx. 120 mi e specified) or b) oral exa andidate, for modules wi ages, time to complete: a ssessment: German, Eng	nutes, for modules w mination of one cand th less than 4 ECTS cr t to 4 weeks) or d) pre lish	ith less than 4 ECTS idate each or oral ex redits approx. 20 min esentation/seminar	credits approx. 90 minutes; un- kamination in groups (approx. 30 nutes) or c) project report (ap- presentation (approx. 30 minu-	
Allocati	on of p	olaces				
Additio	nal info	ormation				
Workloa	ad					
Teachin	ig cycl	e				
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)		
Module	appea	irs in				
Master's Master's Master's Master's	Master's degree (1 major) Physics (2011) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics (2011)					

Module title				Abbreviation		
Current Topics of Theoretical Physics 11-EXT6A-112-mo1				11-EXT6A-112-m01		
Module	coord	inator		Module offered by		
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current study a	topics broad.	of Theoretical Physics. A	ccredited academic a	achievements, e.g. ir	n case of change of university or	
Intende	ed leari	ning outcomes				
The stu sics of t sics and of Theo	dents l the Ma d have retical	nave advanced competer ster's programme. They h mastered the required m Physics.	ncies corresponding t ave advanced specia ethods. They are able	o the requirements o alist knowledge of a e to apply the acquir	of a module of Theoretical Phy- subdiscipline of Theoretical Phy- ed methods to current problems	
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly o	contact hours) and co	urse language availa	able)	
Method module is	l of ass creditab	sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
a) writte in group c) proje (approx Langua	en exar os (app oct repo x. 30 m ge of a	mination (approx. 120 mi prox. 30 minutes per cano ort (approx. 8 to 10 pages inutes) ssessment: German, Eng	nutes) or b) oral exan lidate, for modules w , time to complete: 1 lish	nination of one cand ith less than 4 ECTS to 4 weeks) or d) pre	lidate each or oral examination credits approx. 20 minutes) or esentation/seminar presentation	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	Teaching cycle					
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)		
Module	appea	ars in				
Master'	s degr	ee (1 major) Physics (201	1)			
Master'	Master's degree (1 major) FOKUS Physics (2011)					





Mathematical Physics

(ECTS credits)

Module title					Abbreviation	
Analysi	is and (Geometry of Classical	Systems		10-M=MP1-122-mo	1
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathe	matics)	Institute of Mathem	natics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester graduate		Certain prerequisite sessment. The lectur at the beginning of t sidered a declaratio dents have obtained the course of the se sessment into effect ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to according the semester.			
Conten	ts					
Moderr geomet tion to geomet ty theor	n analy try) for outer lo tric meo ry.	tic methods (such as p the description of clas bad (deformation of ela chanics and symplection	artial differential equat sical physics. Examples astic bodies, flow of a fl c geometry, classical fie	ions) and geometric s include movements uid, stream of a gas) eld theory and classi	methods (such as d s of deformable bodi . Additional exampl cal gauge theory, ge	ifferential es as reac- es include neral relativi-
Recomi Basic k is recor	mende nowled nmend	d previous knowledge: lge from the modules ' led. Furthermore, basic	Differential Geometry", knowledge of classica	, "Introduction to Top l field theory is usefu	oology" and "Geome Jl.	tric Analysis"
Intende	ed lear	ning outcomes				
The stu master:	dent g s advai	ains insight into mode nced techniques in this	rn methods in mathema s field and is able to ap	atics, which are appl ply them to complex	ied in classical phys problems.	ics. He/She
Course	S (type, r	number of weekly contact hour	rs, language — if other than Gei	rman)		
V + Ü (r	no infoi	rmation on SWS (week	ly contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	eessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
At the t examin minute Langua	beginni ation (s), c) o ge of a	ng of the course, the le approx. 90 to 120 minu ral examination in grou ssessment: German, E	ecturer will choose one utes; usually chosen), b ups of 2 candidates (ap nglish	of the following met) oral examination o prox. 30 minutes tot	hods of assessment f one candidate eac al)	: a) written h (approx. 20
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referre	d to in	LPO I (examination regulat	ions for teaching-degree progra	ummes)		
Master's wi	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 Aaster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 210 / 296

Module appears in

Master's degree (1 major) Mathematical Physics (2012) Master's degree (1 major) FOKUS Physics (2011)

Master's with 1 major FOKUS Physics (2011)		
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Module title Abbreviation						
Algebra and Dynamics of Quantum Systems 10-M=MP2-122-m01					1	
Module coordinator				Module offered by		
Dean o	f Studi	es Mathematik (Mathe	natics)	Institute of Mathem	atics	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 semester graduate		graduate	Certain prerequisite sessment. The lectu at the beginning of sidered a declaratio dents have obtained the course of the se sessment into effec ted to assessment i sessment at a later admission to assess	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be con- sidered a declaration of will to seek admission to assessment. If stu- dents have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for as- sessment into effect. Students who meet all prerequisites will be admit- ted to assessment in the current or in the subsequent semester. For as- sessment at a later date, students will have to obtain the qualification for admission to assessment anew.		
Conten	Its					
Moderr braic q Recom Basic k plex Ar	n algeb uantun mende nowleo nalysis"	raic methods for dynar n field theory, spectral d previous knowledge: dge from the modules " is recommended. Bas	nics of quantum system theory, symmetries and Functional Analysis", " ic knowledge of quantu	ns, e.g. operator algo d representation theo Introduction to Topo um mechanics is also	ebras with application ory. logy" and "Introduct o useful.	ons in alge- ion to Com-
Intend	ed lear	ning outcomes				
The stu master	ıdent g s adva	ains insight into moder nced techniques in this	n methods in mathema field and is able to ap	atics, which are appl ply them to complex	ied in quantum phys problems.	ics. He/She
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
1) Ü + V	no infoi	rmation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Metho module is	d of ass s creditab	sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
At the t examin minute Langua	beginni hation (es), c) o age of a	ng of the course, the le approx. 90 to 120 minu ral examination in grou ssessment: German, E	ecturer will choose one ites; usually chosen), b ps of 2 candidates (ap nglish	of the following met) oral examination o prox. 30 minutes tot	hods of assessment f one candidate eac al)	: a) written h (approx. 20
Allocat	ion of j	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	ars in				
Master	's degr	ee (1 major) Mathemat	cal Physics (2012)			
Master's w	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record M	; • generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 212 / 296





Master's degree (1 major) FOKUS Physics (2011)

Master's with 1 major FOKUS Physics (2011)	
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Research Modules Physics

(16 ECTS credits)

Students must achieve a minimum of 16 ECTS credits.

Module title				Abbreviation		
FOKUS Research Module Experimental Particle Physics			Particle Physics		11-FM-TPE-092-m01	
Module coordinator				Module offered by		
chairpe	rson of	f examination committee		Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duration Mo		Module level	Other prerequisites			
1 semester graduate		11-KET; recommended: 11-DTS, 11-TPS				
Contents						
Specific and advanced knowledge of independent scientific work in a current research area, especially in the dis- cipline of Experimental Particle Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions.						
Intende	ed learr	ning outcomes				
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the field of Experimental Particle Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a sub-area of the current research area in an oral presentation.						
Course	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
Experimentelle Teilchenphysik (Experimental Particle Physics): V (2 weekly contact hours) + Ü/P (1 weekly con- tact hour), German or English, once a year (details to be announced) Kompaktseminar Experimentelle Teilchenphysik (Block Taught Seminar Experimental Particle Physics): S (2 wee- kly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)						
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether						
module is creditable for bonus)						
 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 						
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year (details to be announced); details on when assessment component 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.						
Allocation of places						
 Additional information						
Workload						
Teaching cycle						
	5 .,					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) FOKUS Physics (2010)						

Master's with 1 major FOKUS Physics (2011)





Master's degree (1 major) FOKUS Physics (2011)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.				
	data record Master (120 ECTS) FOKUS Physik - 2011				
Module	title				Abbreviation
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FOKUS Research Module Semiconductor Lasers			11-FM-HLF-092-m01		
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committee	_	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Specific cipline cies.	c and a of sem	dvanced knowledge of ir iconductor lasers, reproc	dependent scientific luction of knowledge	work in a current re , acquisition of socia	search area, especially in the dis- al and methodological competen-
Intende	ed learn	ning outcomes			
The stu especia acquire	dents h ally in t d meth	nave special and advance he field of semiconducto ods and to summarise a	ed knowledge of inde r lasers, and are able sub-area of the curre	pendent scientific w to reproduce the ac ent research area in a	ork in a current research area, quired knowledge, to apply the an oral presentation.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Halbleiterlaser - Grundlagen und aktuelle Forschung (Semiconductor Lasers - Principles and Current Research): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester) Kompaktseminar Halbleiterlaser (Block Taught Seminar Semiconductor Lasers): S (2 weekly contact hours), Ger- man or English, details on availability to be announced (block taught seminar (3 days), usually held during se- mester broak)				inciples and Current Research): V a year (summer semester) S (2 weekly contact hours), Ger- days), usually held during se-	
Method module is	l of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 					
Assessi Studen Assessi ponent To pass	Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the summer semester; details on when assessment com- ponent 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2				e announced). etails on when assessment com- sessment component 2.
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	irs in			
Master'	s degre	ee (1 major) FOKUS Physi	cs (2010)		





Master's with 1 major FOKUS Physics (2011)	
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Module title			Abbreviation	
FOKUS Research Module Applied	Semiconductor Physics a	nd Devices	11-FM-SPD-102-m01	
Module coordinator		Module offered by		
chairperson of examination comm	ittee	Faculty of Physics a	and Astronomy	
ECTS Method of grading	Only after succ. cor	npl. of module(s)		
10 numerical grade				
Duration Module level	Other prerequisites	5		
1 semester graduate	11-KM-2			
Contents				
Specific and advanced knowledge specialist field of Semiconductor F methodological competencies. Pri tors. Components from the areas c	of independent scientific Physics and Components nciples of Semiconducto of electronics and photon	c work in a current re , reproduction of kno r Physics. Introductic ics.	search area, especially in the wledge, acquisition of social and on to key theories on semiconduc-	
Intended learning outcomes				
Physics. They are familiar with the and phononic band structures of in perties. They know the realisation conductors and their technologica are able to summarise their knowl	properties of semicondu properties of semicondu mportant semiconductor possibilities of low-dime l importance. They have edge in an oral presentat	ependent scientific w ctors, they have gain s and the resulting el nsional charge carrie acquired advanced k ion.	vork in Applied Semiconductor led an overview of the electronic lectronic, optical and thermal pro- er systems on the basis of semi- nowledge of a special topic and	
Courses (type, number of weekly contact h	ours, language — if other than Ge	rman)		
Halbleiterphysik und Bauelemente (Applied Semiconductor Physics and Devices): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (winter semester) Kompaktseminar Halbleiterphysik und Bauelemente (Block Taught Seminar Applied Semiconductor Physics and Devices): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)				
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether				
module is creditable for bonus)				
 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 				
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- nent 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.				
Allocation of places				
Additional information				
Tooching cyclo				

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Master's with 1 major FOKUS Physics (2011)	
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Module	title				Abbreviation
FOKUS Research Module Theoretical Solid State Physics			11-FM-TFK-092-m01		
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committee	_	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Recommended: 11-K	(M, 11-TQM	
Conten	ts				
Specific cipline compet	c and a of Theo encies	dvanced knowledge of ir pretical Solid-State Physic	dependent scientific cs, reproduction of ki	work in a current re nowledge, acquisitic	search area, especially in the dis- on of social and methodological
Intende	ed leari	ning outcomes			
The stu especia apply th	dents l Illy in t ne acqu	nave special and advance he field of Theoretical So uired methods and to sur	ed knowledge of inde lid-State Physics, and nmarise a sub-area o	pendent scientific w d are able to reprodu f the current researc	rork in a current research area, ice the acquired knowledge, to h area in an oral presentation.
Course	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Theoretische Festkörperphysik (Theoretical Solid State Physics): V (4 weekly contact hours) + Ü/P (2 weekly con- tact hours), German or English, once a year (winter semester) Kompaktseminar Theoretische Festkörperphysik (Block Taught Seminar Theoretical Solid State Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) This module has the following assessment components					
 Topics covered inflectures and exercises: written examination (approx. 90 minutes) of talk (approx. 30 minutes) or project report (approx. 8 pages) Seminar: talk (approx. 30 to 45 minutes) Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- 					
nent 2 v To pass	will be this m	offered to be announced nodule, students must pa	ss both assessment	component 1 and as	sessment component 2.
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
Teaching cycle					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	in in			
Master'	s degr	ee (1 major) FOKUS Physi	cs (2010)		





Module	title				Abbreviation
FOKUS Research Module Theory of Superconductivity 11-FM-TSL-092-m01			11-FM-TSL-092-m01		
Module	coord	inator		Module offered by	
chairpe	rson of	f examination committee	_	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Content	ts				
Specific cipline cies.	c and a of Supe	dvanced knowledge of ir erconductivity, reproduct	idependent scientific ion of knowledge, ac	work in a current re quisition of social a	search area, especially in the dis- nd methodological competen-
Intende	d lear	ning outcomes			
The stue especia apply th	dents h Illy in t ne acqu	nave special and advance he field of the theory of s uired methods and to sur	ed knowledge of inde uperconductivity, and nmarise a sub-area o	pendent scientific w d are able to reprodu f the current researc	ork in a current research area, ice the acquired knowledge, to h area in an oral presentation.
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Theorie der Supraleitung (Theory of Superconduction): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester) Kompaktseminar Theorie der Supraleitung (Block Taught Seminar Theory of Superconduction): S (2 weekly con- tact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)				s) + Ü/P (1 weekly contact hour), erconduction): S (2 weekly con- ught seminar (3 days), usually	
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether					
module is creditable for bonus)					
This mo 1. Topic tes) c repor 2. Semi	odule h s cove or oral o t (appr nar: ta	as the following assessm red in lectures and exerc examination of one candi rox. 8 pages) lk (approx. 30 to 45 minu	nent components ises: written examina idate each or oral exa tes)	tion (approx. 90 mir mination in groups	nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project
Assessi Student Assessi ponent To pass	Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the summer semester; details on when assessment com- ponent 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2				
Allocati	ion of p	olaces			
Additional information					
Workload					
Teachin	ig cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	ars in			
Master'	s degre	ee (1 major) FOKUS Physi	cs (2010)		

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Master's with 1 major FOKUS Physics (2011)	
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Module title				Abbreviation	
FOKUS Research Module Theoretical Astrophysics			11-FM-AST-092-m01		
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	Mechanics, electrod mic, nuclear and pa	lynamics, programm rticle physics, therm	ing in C++; recommended: ato- odynamics.
Conten	ts				
Specific plex ob gical co	c and a servati mpete	dvanced knowledge of in on results; numeric simu ncies.	dependent scientific lations. Reproduction	work in Theoretical n of knowledge, acqu	Astrophysics; modelling of com- uisition of social and methodolo-
Intende	ed lear	ning outcomes			
The stu They ha vations summa	dents l ive bas and to rise th	have special and advance sic knowledge of the meth o test the models with the eir knowledge in an oral p	ed knowledge of inde nods of Theoretical A help of simulations. presentation.	pendent scientific w strophysics. They are They are able to acc	ork in Theoretical Astrophysics. e able to design complex obser- juire advanced knowledge and to
Courses	5 (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
Theoret Kompal hours), during	ische / ktsemi Germa semest	Astrophysik (Theoretical A nar Theoretische Astroph In or English, details on a ter break)	Astrophysics): V (3 wo ysik (Block Taught So vailability to be anno	eekly contact hours) eminar Theoretical A ounced (block taught	+ Ü/P (1 weekly contact hour) strophysics): S (2 weekly contact seminar (3 days), usually held
Methoo module is	l of ass creditab	s essment (type, scope, langua; le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
This mo 1. Topic tes) o repor 2. Semi	 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 				nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project
Assess Studen Details To pass	ment c ts mus on who this m	omponent 2 will be offere t register for assessment en assessment compone nodule, students must pa	ed in German or Engli components 1 and 2 nt 2 will be offered to ss both assessment	sh. online (details to be be announced. component 1 and as	announced). sessment component 2.
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	ars in			
Master'	s degr	ee (1 major) FOKUS Physi	cs (2010)		





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Module title Abbreviation			Abbreviation			
FOKUS Research Module Complex Systems 11-FM-PKS-092-m01			1			
Modul	e coord	inator		Module offered by		
chairp	erson o	f examination committ	ee	Faculty of Physics a	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	nts					
Specifi - Statis chaotic Carlo s	c and a stical m c lasers imulati	dvanced knowledge fo echanics and informat . Encoding, chaotic net on. Random walk, stoo	r independent scientifi on theory Non-linear works Critical pheno hastic processes beyon	c work in the field of dynamics: Determin mena: Scaling law, p nd the thermal equili	physics of complex istic chaos, synchro hase transformation brium.	systems. nisation, ns, Monte
Intend	ed lear	ning outcomes				
The stu comple which knowle	udents ex syste are use edge of	have special and advar ems. They know and ar d to describe physics o a specialist field and p	nced knowledge of inde e able to apply the met of complex systems, to rove their knowledge in	ependent scientific w hods of Statistical Pl current questions. Tl n a seminar presenta	vork in the field of ph nysics and non-linea ney have acquired ac ntion.	iysics of r dynamics, dvanced
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
Physik hours) Kompa man oi mester	Physik komplexer Systeme (Physics of Complex Systems): V (2 weekly contact hours) + Ü/P (2 weekly contact hours), German or English, once a year (winter semester) Kompaktseminar Komplexe Systeme (Block Taught Seminar Complex Systems): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester broak)					y contact hours), Ger- during se-
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
This m 1. Topi tes) repo 2. Sem	 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 					x. 30 minu-) or project
Assess Studer Assess sessm To pas	Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered in the winter semester (details to be announced); details on when as- sessment component 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2					n when as- nt 2.
Allocat	tion of p	olaces				
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Master's w	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 227 / 296

Module appears in

Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

Master's with 1	major FOKUS	Physics	(2011)
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Module title				Abbreviation		
FOKUS	FOKUS Research Module Complex Systems with Mini Research Project 11-FM-PKS-MF-092-m01					
Modul	e coord	inator		Module offered by		
chairpe	erson o	f examination committ	ee	Faculty of Physics a	and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
12	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conter	Its					
Specifi specia petenc researc ar dyna mena: the the	c and a list field ies. Ap ch proje amics: I Scaling ermal ed	dvanced knowledge fo d of Complex Systems, plication of the acquire ect (e.g. experiments, c Deterministic chaos, sy g law, phase transforma quilibrium.	or independent scientifi reproduction of knowle ed professional knowle ase studies etc.) Stat rnchronisation, chaotic ations, Monte Carlo sim	c work in a current re edge, acquisition of s dge and methods to istical mechanics an lasers. Encoding, ch nulation. Random wa	esearch area, especially in the social and methodological com- new scientific questions in a min id information theory Non-line- aotic networks Critical pheno- lk, stochastic processes beyond	
Intend	ed lear	ning outcomes				
The stu comple which knowle ly impl	idents ex syste are use edge of ement	have special and advar ems. They know and are d to describe physics o a specialist field and p the acquired knowledg	nced knowledge of inde e able to apply the met of complex systems, to rove their knowledge in e and methods in a min	ependent scientific w hods of Statistical Ph current questions. Th n a seminar presenta ni research project.	vork in the field of physics of hysics and non-linear dynamics, hey have acquired advanced htion. They are able to successful-	
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
Physik komplexer Systeme (Physics of Complex Systems): V (2 weekly contact hours) + Ü/P (2 weekly contact hours), German or English, once a year (winter semester) Kompaktseminar Komplexe Systeme (Block Taught Seminar Complex Systems): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break) Miniforschungsprojekt Komplexe Systeme (Mini Research Project Complex Systems): P (2 weekly contact hours), German or English, details on availability to be announced (either block taught during semester break or approx.						
Metho	d of ass	sessment (type, scope, lang	guage — if other than German,	examination offered — if no	t every semester, information on whether	
module i	s creditab	le for bonus)				
 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 3. Research project: project report (approx. 8 pages) 						
Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- nents 2 and 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.						
Allocation of places						
Additio	onal inf	ormation				
Master's w	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record M	; • generated 26-Aug-2024 • 6 Master (120 ECTS) FOKUS Phys	exam. reg. page 229 / 296 sik - 2011	

Workload

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

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	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title			Abbreviation			
FOKUS Research Spintronic and Physics				11-FM-LHQ-092-mo	1	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committe	ee	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Specifi special logical	c and a ist field compe	dvanced knowledge of d of Spintronics and Na tencies.	independent scientific nophysics, reproductio	: work in a current re on of knowledge, acq	search area, especia uisition of social an	ılly in the d methodo-
Intende	ed lear	ning outcomes				
The stu especia ply the	idents ally in t acquir	have special and advar he field of spintronics a ed methods and to sun	nced knowledge of inde and Nanophysics, and amarise a sub-area of t	ependent scientific w are able to reproduce he current research a	ork in a current rese e the acquired know area in an oral prese	arch area, ledge, to ap- ntation.
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
tor Technology and Theory of Quantum Transport): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), Ger- man or English, once a year (winter semester) Kompaktseminar Spintronik und Nanophysik (Block Taught Seminar Spintronics and Nanophysics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usual- ly held during semester break)						
Method module is	d of ass s creditab	sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
This mo 1. Topio tes) o repo 2. Semi	odule h cs cove or oral rt (app inar: ta	as the following asses red in lectures and exe examination of one car rox. 8 pages) lk (approx. 30 to 45 mi	sment components rcises: written examina ididate each or oral exa nutes)	ation (approx. 90 mir amination in groups	nutes) or talk (appro (approx. 30 minutes	x. 30 minu-) or project
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- nent 2 will be offered to be announced.						
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	appea	urs in				
Master's wi	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record M	• generated 26-Aug-2024 • e Naster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 231 / 296

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 232 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module	title				Abbreviation
FOKUS Research Module Dirac Fermions in Mesoscopic Sys			ns in Mesoscopic Sys	tems	11-FM-RMS-092-m01
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
9	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Conten	ts				
Specific special method	c and a ist field lologica	dvanced knowledge of ir d of Dirac fermions in mes al competencies.	idependent scientific soscopic systems, rep	work in a current read production of knowle	search area, especially in the edge, acquisition of social and
Intende	ed learn	ning outcomes			
The stu especia ge, to a tion.	dents ł Illy in t pply th	nave special and advance he field of Dirac fermions le acquired methods and	ed knowledge of inde in mesoscopic syste to summarise a sub-	pendent scientific w ms, and are able to area of the current re	rork in a current research area, reproduce the acquired knowled- esearch area in an oral presenta-
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Relativi contact Kompal soscop taught	stische hours) ktsemi ic Syste semina	e Effekte in Mesoskopiscl) + Ü/P (1 weekly contact nar Dirac Fermionen in M ems): S (2 weekly contact Ir (3 days), usually held d	nen Systemen (Relati hour), German or Eng esoskopischen Syste t hours), German or E luring semester break	vistic Effects in Meso glish men (Block Taught S nglish, details on av	oscopic Systems): V (3 weekly Seminar Dirac Fermions in Me- railability to be announced (block
Method module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
This mo 1. Topic tes) o repor 2. Semi	odule h cs cove or oral o t (appr nar: ta	as the following assessm red in lectures and exerc examination of one cand rox. 8 pages) lk (approx. 30 to 45 minu	nent components ises: written examina idate each or oral exa tes)	tion (approx. 90 mir mination in groups	nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project
Assessi Studen Details To pass	ment co ts mus on whe this m	omponents 1 and 2 will b t register for assessment en assessment compone iodule, students must pa	e offered in German of components 1 and 2 nt 2 will be offered to ss both assessment	or English. online (details to be be announced. component 1 and as	e announced). sessment component 2.
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	irs in			
Master'	s degre	ee (1 major) FOKUS Physi	cs (2010)		





Master's with 1 major FOKUS Physics (2011)	JMU Würz

Module title				Abbreviation		
FOKUS	FOKUS Research Module Relativistic Quantum Field Theory 11-FM-RQFT-092-m01)1	
Module	coord	inator		Module offered by		
chairpe	rson o	f examination committe	ee	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
12	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	Lectures Theoretisc (Quantum Mechanic	he Physik (Theoretica cs 2) recommended.	al Physics); Quanten	mechanik 2
Conten	ts					
Specific Field Th turbatic ons, rer	c and a leory. S on theo normal	dvanced knowledge of Symmetries, Lagrange f ry, Feynman rules, qua isation.	independent scientific ormalism for fields, fie ntum electrodynamic p	work in the speciali d quantisation, gaug processes in Born ap	st field of Relativistio ge principle and inte proximation, radiativ	: Quantum raction, per- /e correcti-
Intende	ed leari	ning outcomes				
The stu quantu are able an oral	dents l m field e to ap preser	nave special and advar theory. They know the ply perturbation theory tation.	nced knowledge of inde principles and mathen and Feyman rules. The	ependent scientific w natical basics of rela ey are able to summa	vork in the field of rel tivistic quantum fiel rise the acquired kn	ativistic d theory and owledge in
Courses	5 (type, n	umber of weekly contact hour	s, language — if other than Gei	rman)		
kly cont Kompal (2 week 3 days)	tact ho ktsemi kty cont held to	urs), German or English nar Relativistische Qua act hours), German or owards the end of sem	n, once a year (winter s ntenfeldtheorie (Block English, details on ava ester break or at the be	emester) Taught Seminar Rela ilability to be annou ginning of the subse	ativistic Quantum Fie nced (block taught s equent semester)	eminar (1 to
Method module is	creditab	s essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
This mo 1. Topic tes) o repor 2. Semi	odule h s cove or oral o t (appi nar: ta	as the following asses red in lectures and exe examination of one car rox. 8 pages) lk (approx. 30 to 45 mi	sment components rcises: written examina ididate each or oral exa nutes)	ation (approx. 90 mir amination in groups	nutes) or talk (appro: (approx. 30 minutes)	k. 30 minu-) or project
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- nent 2 will be offered to be announced.						
Allocati	ion of p	olaces				
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
		-				
Master's wi	th 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 235 / 296

Module appears in

Master's with 1 major FOKUS Physics (2011)	
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Module title Abbreviation			Abbreviation		
FOKUS Research Module Relativistic Quantum Field Theory with Mini Research 11-FM-RQFT-MF-092-mo1					
Project					
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committe	e	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
16	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme:	ster	graduate	Lectures Theoretisch (Quantum Mechanic	ne Physik (Theoretica cs 2) recommended.	al Physics); Quantenmechanik 2
Conten	ts				
Specific Field Th turbatic ons, ren	c and a leory. S on theo lormal	dvanced knowledge of Symmetries, Lagrange fo ry, Feynman rules, qua isation.	independent scientific ormalism for fields, fiel ntum electrodynamic p	work in the speciali d quantisation, gaug processes in Born ap	st field of Relativistic Quantum ge principle and interaction, per- proximation, radiative correcti-
Intende	ed leari	ning outcomes			
The stu quantu are able an oral and to	dents I m field e to ap presen write de	nave special and advan theory. They know the ply perturbation theory itation. They are able to own the results in a rep	ced knowledge of inde principles and mathen and Feyman rules. The successfully impleme ort.	pendent scientific w natical basics of rela y are able to summa nt the acquired meth	rork in the field of relativistic tivistic quantum field theory and rise the acquired knowledge in nods in a mini research project
Course	S (type, n	umber of weekly contact hours	, language — if other than Ger	man)	
kly contact hours), German or English, once a year (winter semester) Kompaktseminar Relativistische Quantenfeldtheorie (Block Taught Seminar Relativistic Quantum Field Theory): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (1 to 3 days) held towards the end of semester break or at the beginning of the subsequent semester) Miniforschungsprojekt Relativistische Quantenfeldtheorie (Mini Research Project Relativistic Quantum Field Theory): P (2 weekly contact hours), German or English, details on availability to be announced (either block					
Methoo module is	l of ass creditab	essment (type, scope, lange le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, information on whether
 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 3. Research project: project report (approx. 8 pages) 					
Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- nents 2 and 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.					
Allocation of places					
Additional information					
Worklo	ad				
Master's wi	th 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. page 237 / 296 sik - 2011

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

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	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title				Abbreviation	
FOKUS Research Module Theoretical Elementary Particle Physics 11-FM-TEP-092-m01				11-FM-TEP-092-m01	
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee	_	Faculty of Physics a	and Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
12	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate	11-RQFT		
Conten	ts				
Specifi ry Parti rules, s	c and a cle Phy standar	dvanced knowledge of ir sics. Principles of relativi d model of strong and ele	dependent scientific istic quantum field th ectroweak interaction	work in the speciali eory, perturbation the of leptons and qua	st field of Theoretical Elementa- neory and application of Feynman rks.
Intende	ed lear	ning outcomes			
The stu mentar ry Parti mental	dents l y Partic cle Phy observ	have special and advance the Physics. They know th sics and understand the vations. They are able to s	ed knowledge of inde e mathematical meth structure of the stand summarise the acquir	pendent scientific w ods for the descript dard model based or red knowledge in an	vork in the field of Theoretical Ele- ion of phenomena of Elementa- n symmetry principles and experi- oral presentation.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
Theore P (2 we Kompa Physics minar (tische I ekly co ktsemi s): S (2 1 to 3 d	Elementarteilchenphysik ontact hours), German or nar Theoretische Elemen weekly contact hours), G lays) held towards the en	(Theoretical Element English, once a year (tarteilchenphysik (Blo erman or English, de d of semester break	ary Particle Physics) (summer semester) ock Taught Seminar tails on availability t or at the beginning c	: V (4 weekly contact hours) + Ü/ Theoretical Elementary Particle o be announced (block taught se- of the subsequent semester)
Metho module is	d of ass s creditab	Sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
This mo 1. Topic tes) repo 2. Sem	odule h cs cove or oral rt (appi inar: ta	as the following assessm red in lectures and exerc examination of one cand rox. 8 pages) lk (approx. 30 to 45 minu	nent components ises: written examina idate each or oral exa tes)	ation (approx. 90 min amination in groups	nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project
Assess Studen Details To pass	ment c ts mus on whe s this m	omponents 1 and 2 will b t register for assessment en assessment compone nodule, students must pa	e offered in German o components 1 and 2 nt 2 will be offered to ss both assessment	or English. online (details to be be announced. component 1 and as	e announced). sessment component 2.
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	e appea	ars in			
Master	Master's degree (1 major) FOKUS Physics (2010)				

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Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.
	data record Master (120 ECTS) EOKUS Physik - 2011

- 2011

Module title				Abbreviation	
FOKUS Resea search Proje	arch Module Theoretical E ct	lementary Particle Pł	nysics with Mini Re-	11-FM-TEP-MF-092-m01	
Module coor	dinator		Module offered by		
chairperson (of examination committee		Faculty of Physics a	nd Astronomy	
ECTS Meth	od of grading	Only after succ. com	pl. of module(s)		
16 num	erical grade				
Duration	Module level	Other prerequisites			
1 semester	graduate	11-RQFT			
Contents					
Specific and ry Particle Ph rules, standa	advanced knowledge of ir ysics. Principles of relativi rd model of strong and ele	ndependent scientific istic quantum field th ectroweak interaction	work in the speciali eory, perturbation the of leptons and quar	st field of Theoretical Elementa- neory and application of Feynman rks.	
Intended lea	rning outcomes				
mentary Part ry Particle Ph mental obser to successful port.	icle Physics. They know th ysics and understand the vations. They are able to s ly implement the acquired	e mathematical meth structure of the stand summarise the acquir d methods in a mini re	ands for the description dard model based or red knowledge in an esearch project and	ion of phenomena of Elementa- n symmetry principles and experi- oral presentation. They are able to write down the results in a re-	
Courses (type,	number of weekly contact hours, l	anguage — if other than Ger	man)		
P (2 weekly c Kompaktsem Physics): S (2 minar (3 days Miniforschun Particle Phys block taught	Theoretische Elementarteilchenphysik (Theoretical Elementary Particle Physics): V (4 weekly contact hours) + Ü/ P (2 weekly contact hours), German or English, once a year (summer semester) Kompaktseminar Theoretische Elementarteilchenphysik (Block Taught Seminar Theoretical Elementary Particle Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught se- minar (3 days), usually held during semester break) Miniforschungsprojekt Theoretische Elementarteilchenphysik (Mini Research Project Theoretical Elementary Particle Physics): P (2 weekly contact hours), German or English, details on availability to be announced (either				
Method of as module is credita	sessment (type, scope, langua ble for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
This module 1. Topics cov tes) or oral report (app 2. Seminar: t 3. Research p	 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 3. Research project: project report (approx. 8 pages) 				
Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 2 and 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.				o be announced). ed. . through 3.	
Allocation of	places				
Additional in	formation				
Workload					

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 242 / 296
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Module	title				Abbreviation	
FOKUS Research Module Quantum Phenomena in electronic correlated Materi-			c correlated Materi-	11-FM-QPM-092-mc	01	
als						
Module	coord	inator		Module offered by		
chairpe	rson of	examination committee	2	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
Specific special quisitio "strong ture sup	c and a ist field n of so ly corre percon	dvanced knowledge of i l of quantum phenomen cial and methodologica elated electron systems" ductivity, and much mor	ndependent scientific a in electronically cor l competencies. Introc : Metal-insulator trans e.	work in a current re- related materials, re duction to the excitir sitions, Kondo effect	search area, especia production of knowl ng and current resea , heavy fermions, Hi	ally in the edge, ac- rch area of gh-tempera-
Intende	ed learn	ning outcomes				
The stu especia techniq se a sul	dents h Illy in t ues, ai b-area	nave special and advance he field of quantum phe nd are able to reproduce of the current research a	ed knowledge of inde nomena in electronica the acquired knowle rrea in an oral present	pendent scientific w ally correlated mater dge, to apply the acc ation.	vork in a current rese ials, laboratory and quired methods and	earch area, measuring to summari-
Courses	5 (type, n	umber of weekly contact hours,	language — if other than Ger	man)		
Quante terials): announ Kompal Phenon bility to	nphän : V (3 w iced) ktsemi nena in be ani	omene in elektronisch k eekly contact hours) + Ü nar Quantenphänomene Electronic Correlated M nounced (block taught s	orrelierten Materialier I/P (1 weekly contact H in elektronisch korre aterials): S (2 weekly eminar (3 days), usua	n (Quantum Phenom nour), German or Eng lierten Materialien (E contact hours), Gern lly held during seme	ena in Electronic Cor glish, once a year (de Block Taught Semina nan or English, detai ester break)	rrelated Ma- etails to be ar Quantum ils on availa-
Method module is	l of ass creditab	essment (type, scope, langu le for bonus)	age — if other than German, e	examination offered — if no	t every semester, informati	ion on whether
This mo 1. Topic tes) o repor 2. Semi	odule h s cove or oral e t (appr nar: ta	as the following assess red in lectures and exer- examination of one cano ox. 8 pages) lk (approx. 30 to 45 min	nent components cises: written examina lidate each or oral exa utes)	ation (approx. 90 mir amination in groups	nutes) or talk (appro (approx. 30 minutes)	x. 30 minu-) or project
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year (details to be announced); details on when assessment component 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.						
Allocat	ion of p	olaces				
Additional information						
Workload						
	-					
Teachir	ig cycl	9				
	,					
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 243 / 296

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

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Module title			Abbreviation		
FOKUS Research Module Quantum Phenomena in electronic correlated Materi-			11-FM-QPM-MF-092-m01		
als with	n Mini F	Research Project			
Module	coord	inator		Module offered by	
chairpe	rson of	examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
14	numei	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Specific special sition o thods to the exc do effect	c and a ist field f socia o new s iting ar ct, heav	dvanced knowledge of ir l of quantum phenomena l and methodological cor scientific questions in a r nd current research area o /y fermions, high-temper hing outcomes	dependent scientific a in electronically cor npetencies. Applicati nini research project of "strongly correlated ature superconductiv	work in a current re- related materials, re ion of the acquired p (e.g. experiments, ca d electron systems": rity, and much more.	search area, especially in the production of knowledge, acqui- professional knowledge and me- ase studies etc.). Introduction to Metal-insulator transitions, Kon-
The stu especia produce arch are researc	dents h Illy in tl e the ad ea in ar h proje	nave special and advance he specialist field of qua cquired knowledge, to ap n oral presentation and to ct.	ed knowledge of inde ntum phenomena in e oply the acquired met o successfully implen	pendent scientific w electronically correla hods, to summarise nent the acquired kn	ork in a current research area, ated materials, and are able to re- a sub-area of the current rese- owledge and methods in a mini
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Quante terials): announ Kompal Phenon bility to Minifor: tum Phe availab	Quantenphänomene in elektronisch korrelierten Materialien (Quantum Phenomena in Electronic Correlated Ma- terials): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (details to be announced) Kompaktseminar Quantenphänomene in elektronisch korrelierten Materialien (Block Taught Seminar Quantum Phenomena in Electronic Correlated Materials): S (2 weekly contact hours), German or English, details on availa- bility to be announced (block taught seminar (3 days), usually held during semester break) Miniforschungsprojekt Quantenphänomene in elektronisch korrelierten Materialien (Mini Research Project Quan- tum Phenomena in Electronic Correlated Materials): P (2 weekly contact hours), German or English, details on				
Method	l of ass	essment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether
 module is creditable for bonus) This module has the following assessment components Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) Seminar: talk (approx. 30 to 45 minutes) Research project: project report (approx. 8 pages) Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Assessment component 1 will be offered once a year (details to be announced); details on when assessment components 2 and 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.					
Allocat	ion of p	olaces			
Additio	nal info	ormation			

Master's with 1 major FOKUS Physics (201	1)

Workload

Teaching cycle

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

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	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title		Abbreviation				
FOKUS Research Module Biophysics - Laboratory and Measurement Technolo-			11-FM-LMB-092-mo	1		
gy						
Module	coord	inator		Module offered by		
chairpe	rson of	examination committe	e	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts		_			
Specific special thodolc	c and a ist field ogical c	dvanced knowledge of l of Biophysics - laborat ompetencies.	independent scientific ory - metrology, reproc	work in a current re duction of knowledge	search area, especia e, acquisition of soc	ılly in the ial and me-
Intende	ed learr	ning outcomes				
The stu especia quired l an oral	dents ł Illy in t knowle presen	nave special and advan he field of Biophysics a dge, to apply the acqui tation.	ced knowledge of inde nd laboratory and mea red methods and to su	pendent scientific w suring techniques, a mmarise a sub-area	ork in a current rese and are able to repro of the current resea	arch area, duce the ac- rch area in
Course	5 (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
Labor- (contact Kompal sureme (block t Method module is This mo	und Me hours) ktsemin nt Tech aught s creditab	esstechnik in der Biophy + Ü/P (1 weekly contact har Biophysik - Labor- u nology): S (2 weekly co seminar (3 days), usual essment (type, scope, langu- le for bonus) as the following assess	vsik (Laboratory and M t hour), German or Eng nd Messtechnik (Block ntact hours), German ly held during semeste lage – if other than German, e ment components	easurement Techno glish, once a year (su < Taught Seminar Bio or English, details or er break) examination offered — if no	logy in Biophysics): immer semester) ophysics - Laborator n availability to be a t every semester, informati	V (3 weekly y and Mea- nnounced ion on whether
1. Topic tes) c repor 2. Semi	t (appr nar: ta	red in lectures and exer examination of one can ox. 8 pages) lk (approx. 30 to 45 min	cises: written examina didate each or oral exa utes)	ition (approx. 90 min imination in groups	nutes) or talk (appro (approx. 30 minutes	x. 30 minu-) or project
Assessi Studen Assessi ponent To pass	ment co ts mus ment co 2 will t this m	omponents 1 and 2 will t register for assessmer omponent 1 will be offer oe offered to be announ odule, students must p	be offered in German of t components 1 and 2 red once a year in the s ced. ass both assessment	or English. online (details to be summer semester; d component 1 and as	e announced). etails on when asse sessment componet	ssment com- nt 2.
Allocati	ion of p	olaces				
 Additional information 						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	appea	rs in				
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record M	• generated 26-Aug-2024 • 6 laster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 247 / 296

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 248 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title			Abbreviation			
FOKUS Research Module Biophysics - Biophysical Measurement Technology			11-FM-BMT-092-mo	1		
in Medi	cal Sci	ence				
Module	coord	inator		Module offered by		
chairpe	rson of	f examination committe	e	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	numer	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
Specific cipline method	c and a of Biop lologica	dvanced knowledge of hysics - biophysical me al competencies.	independent scientific etrology in medicine, re	work in a current re- eproduction of know	search area, especia ledge, acquisition of	illy in the dis- Fsocial and
Intende	ed learr	ning outcomes				
The stu especia ce the a area in	dents h Illy in tl acquire an oral	nave special and advan he field of Biophysics a d knowledge, to apply presentation.	ced knowledge of inde nd biophysical measu the acquired methods	ependent scientific w ring techniques in m and to summarise a	rork in a current rese edicine, and are abl sub-area of the curr	arch area, e to reprodu- ent research
Courses	S (type, n	umber of weekly contact hours	, language — if other than Ger	rman)		
Biophys weekly Kompal Biophys tails on Method	sikaliso contac ktsemin sical M availa I of ass	the Messtechnik in der t hours) + Ü/P (1 weekk nar Biophysik - Biophys easurement Technolog bility to be announced essment (type, scope, lang	Medizin (Biophysical I y contact hour), Germa ikalische Messtechnik y in Medical Science): (block taught seminar uage – if other than German, d	Measurement Techno n or English, once a in der Medizin (Bloo S (2 weekly contact l (3 days), usually hel examination offered – if no	ology in Medical Scie year (winter semeste ck Taught Seminar B nours), German or Er d during semester b t every semester, informati	ence): V (3 er) iophysics - nglish, de- reak) ion on whether
module is	creditab	le for bonus)			·	
This mo 1. Topic tes) o repor 2. Semi	odule h cs cove or oral e t (appr nar: tal	as the following assess red in lectures and exe examination of one can rox. 8 pages) lk (approx. 30 to 45 mir	ment components rcises: written examina didate each or oral exa nutes)	ation (approx. 90 mir amination in groups	nutes) or talk (appro (approx. 30 minutes	x. 30 minu-) or project
Assessi Student Assessi nent 2 v To pass	ment co ts must ment co will be this m	omponents 1 and 2 will t register for assessmer omponent 1 will be offe offered to be announce rodule, students must p	be offered in German at components 1 and 2 red once a year in the d. bass both assessment	or English. online (details to be winter semester; det component 1 and as	e announced). ails on when assess sessment componel	ment compo- nt 2.
Allocati	ion of p	olaces				
 Additional information Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
-						
Module	appea	irs in				
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 Naster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 249 / 296

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.	page 250 / 296
	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title			Abbreviation			
FOKUS	Resea	rch Module Nano Optic	5		11-FM-NOP-092-mo	1
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committe	e	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Specific and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Nano-Optics, reproduction of knowledge, acquisition of social and methodological competencies.						
Intende	ed leari	ning outcomes				
The stu especia methoo	dents l ally in t is and	nave special and advan he field of nano-optics, to summarise a sub-are	ced knowledge of inde and are able to reprod a of the current resear	pendent scientific w uce the acquired kn ch area in an oral pro	ork in a current rese owledge, to apply th esentation.	arch area, e acquired
Course	S (type, n	umber of weekly contact hours	, language — if other than Ger	man)		
Nanoel once a Kompa or Engli break)	ektroni year (s ktsemi ish, det	k (Nanoelectronics): V ummer semester) nar Nanoelektronik (Blo rails on availability to b	(3 weekly contact hour ock Taught Seminar Na e announced (block ta	s) + Ü/P (1 weekly co noelectronics): S (2 v ught seminar (3 days	ontact hour), German weekly contact hours s), usually held durir	or English, s), German ng semester
Methoo module is	l of ass creditab	s essment (type, scope, lang le for bonus)	uage — if other than German, e	examination offered — if no	t every semester, informati	on on whether
This mo 1. Topic tes) o repor 2. Semi	odule h cs cove or oral o rt (appi inar: ta	as the following assess red in lectures and exe examination of one can 'ox. 8 pages) lk (approx. 30 to 45 mir	ment components rcises: written examina didate each or oral exa nutes)	ition (approx. 90 mir amination in groups	nutes) or talk (approz (approx. 30 minutes)	x. 30 minu-) or project
Assess Studen meet ce about t Assess ponent To pass	Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Students must meet certain prerequisites to qualify for admission to assessment component 1. The lecturer will inform them about the respective details at the beginning of the course. Assessment component 1 will be offered once a year in the summer semester; details on when assessment com- ponent 2 will be offered to be announced.					nts must orm them ssment com- nt 2.
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	9				
Referre	d to in	LPOI (examination regulation	ns for teaching-degree progra	mmes)		
Master's wi	th 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 251 / 296

Module appears in

Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

Master's with 1 major FOKUS Physics (2011)	
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JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Master (120 ECTS) FOKUS Physik - 2011
Module title				Abbreviation		
FOKUS Research Module Quantum Transport in Semiconductor Nanostructu-			11-FM-QTH-102-m01			
res						
Module	coord	inator		Module offered by		
chairpe	rson of	examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Conten	ts					
Specific phenon compor fields o	c and a nena th nents. T f mode	dvanced knowledge of in hat cannot be observed ir The research module prov rn nanoelectronic compo	dependent scientific n classical electronic vides insights into pr onents, which functio	work in the field of switches appear in h oduction techniques n on the basis of bal	quantum transport. Transport nighly miniaturised electronic s, characteristics and application llistic and coherent transport.	
Intende	ed learr	ning outcomes				
The stu of quan They kn ledge, t on.	dents h itum tra iow fun io apply	nave special and advance ansport. They have maste ctions and applications o y the acquired methods a	ed knowledge of inde ered the basics of ele of respective compon and to summarise a fi	pendent scientific w ctronics of nanostru- ients and are able to eld of the current res	rork in the current research area ctures in theory and practice. reproduce the acquired know- search area in an oral presentati-	
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
Quante kly cont Kompal Semico nounce	ntransj tact ho ktsemin nducto d (bloc	bort in Halbleiter-Nanosti urs) + Ü/P (1 weekly cont nar Quantentransport in l r Nanostructures): S (2 w k taught seminar (3 days	act hour), German or Aalbleiternanostruktu eekly contact hours)), usually held during	ansport in Semicon English, once a year uren (Block Taught S , German or English, g semester break)	ductor Nanostructures): V (3 wee- · (summer semester) eminar Quantum Transport in details on availability to be an-	
Method module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minu- tes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes)					nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project	
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the summer semester; details on when assessment com- ponent 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.						
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Workload						
Teachir	ng cycl	9				

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Master's with 1 major FOKUS Physics (2011)	
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Module title				Abbreviation		
FOKUS Research Module Low Dimensional Structures					11-FM-NDS-092-m01	
Module	coordi	nator		Module offered by		
chairpe	rson of	examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	d of grading	Only after succ. com	pl. of module(s)		
8	numer	ical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate				
Content	ts					
Specific stal latt	c and a ice syn	dvanced knowledge of in nmetry, lattice dynamics,	dependent scientific growth techniques	work in the field of	low-dimensional structures. Cry-	
Intende	d learn	ing outcomes				
The stund	dents h ctures.	nave special and advance	ed knowledge of inde	pendent scientific w	ork in the field of low-dimensio-	
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
Niederc hour), G Kompal kly cont	limensi German ktsemir tact hou beld d	ionale Strukturen (Low D or English, once a year (nar Niederdimensionale s urs), German or English, uring semester break)	imensional Structure details to be announ Strukturen (Block Tau details on availability	s): V (2 weekly conta ced) ght Seminar Low Din to be announced (b	act hours) + Ü/P (1 weekly contact mensional Structures): S (2 wee- plock taught seminar (3 days),	
Method module is	l of ass	essment (type, scope, langua e for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
This mo 1. Topic tes) c repor 2. Semi	odule h s cover or oral e t (appr nar: tal	as the following assessm red in lectures and exerc examination of one cand ox. 8 pages) k (approx. 30 to 45 minu	nent components ises: written examina idate each or oral exa tes)	tion (approx. 90 mir mination in groups	nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project	
Assessi Student Assessi compor To pass	ment co ts must ment co nent 2 v s this m	omponents 1 and 2 will b register for assessment omponent 1 will be offere vill be offered to be anno odule, students must pa	e offered in German o components 1 and 2 ed once a year (details ounced. ss both assessment o	or English. online (details to be s to be announced); component 1 and as	e announced). details on when assessment sessment component 2.	
Allocati	ion of p	laces			· · · · ·	
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master'	s degre	ee (1 major) FOKUS Physi	cs (2010)			
Master'	s degre	ee (1 major) FOKUS Physi	cs (2011)			

Module title				Abbreviation		
FOKUS Research Module Methods in Surface Spectroscopy 11-FM-MSS-102-m01					1	
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committe	ee	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	11-TQM, 11-KM2 , 11-	FK2 (or 11-T3, 11-E5,	11-E7)	
Conten	ts					
Experin quasipa	nental articles	determination of the ele , electronic correlation	ectronic structure of so s, etc.	lids and surfaces: Ba	and dispersion and l	oand gaps,
Intende	ed lear	ning outcomes				
The stu conduc pline ai	dents l t, evalu nd are	know the physical princ uate and interpret simp able to summarise thei	iples and experimenta le measurements. The r knowledge in an oral	l methods of surface / have acquired adva presentation.	e spectroscopy. They anced knowledge of	are able to a subdisci-
Course	S (type, r	umber of weekly contact hours	s, language — if other than Ger	man)		
Methoo Kompa man or mester	ls in Su ktsemi Englisl break)	Irface Spectroscopy: V nar (Block Taught Semi n, details on availability	(3 weekly contact hour nar) Applications of Su y to be announced (blo	s), usually English, o ırface Spectroscopy: ck taught seminar (3	nce a year (winter se S (2 weekly contact days), usually held	emester) hours), Ger- during se-
Methoo module is	d of ass creditab	s essment (type, scope, lang le for bonus)	uage — if other than German, o	examination offered — if no	t every semester, informati	on on whether
This mo 1. Topic tes) o repor 2. Semi Assess	odule h cs cove or oral rt (appi inar: ta ment c	as the following assess red in lectures and exe examination of one can rox. 8 pages) lk (approx. 30 to 45 min omponents 1 and 2 will	sment components rcises: written examina didate each or oral exa nutes) be offered in German	ation (approx. 90 mir amination in groups or English.	nutes) or talk (approx (approx. 30 minutes)	x. 30 minu-) or project
Assess nent 2 v To pass	ment c will be this m	omponent 1 will be offe offered to be announce nodule, students must p	ered once a year in the ed.	winter semester; det	ails on when assess sessment componer	ment compo- nt 2.
Allocat	ion of p	olaces			·	
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master Master Master	's degr 's degr 's degr	ee (1 major) FOKUS Phy ee (1 major) FOKUS Phy ee (1 major) FOKUS Phy	sics (2010) sics (2011) sics (2006)			
Master's wi	th 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	● generated 26-Aug-2024 ● e laster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 256 / 296

Module title					Abbreviation	
FOKUS	FOKUS Research Module Methods in Surface Spectroscopy with Mini Research 11-FM-MSS-MF-102-mo1					
Project						
Module	coord	inator		Module offered by		
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
12	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	graduate	11-TQM, 11-KM2 , 11-	FK2 (or 11-T3, 11-E5,	11-E7)	
Conten	ts					
Experin quasipa	nental (articles	determination of the elec , electronic correlations	tronic structure of so	lids and surfaces: Ba	and dispersion and band gaps,	
Intende	ed leari	ning outcomes				
The stu Matter" (photo present	dents , they emissi : the re	have gained insights into have acquired basic know on, Auger spectroscopy, s sults obtained with these	a modern research a vledge for the applica spectroscopy with syn e methods in a preser	rea neighbouring on ation of modern metl nchrotron radiation e ntation or a poster.	n different areas of "Condensed hods of surface spectroscopy etc.) and are able to interpret and	
Course	5 (type, n	number of weekly contact hours, la	anguage — if other than Ger	man)		
Method Kosmol Kompal man or mester Minifors tact hou	ls in Su ogie (C ktsemi Englisl break) schung urs)	urface Spectroscopy: V (3 Cosmology): V (3 weekly c nar (Block Taught Semina h, details on availability t gsprojekt zu Surface Spec	weekly contact hours ontact hours) + Ü/P (ar) Applications of Su o be announced (blo :troscopy (Mini Resea	s), usually English, o 1 weekly contact ho rface Spectroscopy: ck taught seminar (3 urch Project Surface S	once a year (winter semester) ur), German or English S (2 weekly contact hours), Ger- 3 days), usually held during se- Spectroscopy): P (2 weekly con-	
Method	l of ass	sessment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
module is	creditab	le for bonus)				
This mo 1. Topic tes) c repor 2. Semi 3. Reser	odule h cs cove or oral o t (appi nar: ta arch pr	as the following assessm red in lectures and exerc examination of one candi rox. 8 pages) lk (approx. 30 to 45 minu roject: project report (app	nent components ises: written examina idate each or oral exa tes) rox. 8 pages)	tion (approx. 90 mir mination in groups	nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project	
Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- nents 2 and 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.						
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	е				

Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg •
	data record May

Module title					Abbreviation	
FOKUS	FOKUS Research Module High Energy Astrophysics 11-FM-HAS-111-m01					
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committe	ee	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	11-A4, 11-KET			
Conten	ts					
Specifi sics.	Specific and advanced knowledge for independent scientific work in the research area of High-Energy Astrophy- sics.					
Intende	ed lear	ning outcomes				
The stu Astroph They ar	dents l nysics. e able	nave special and advar They have knowledge o to reproduce and sumr	iced knowledge of inde of cosmology and/or Pl narise the acquired kno	pendent scientific w asma Astrophysics (owledge in a semina	ork in the field of Hi cf. modules 11-AKM, r presentation.	gh-Energy 11-APL).
Course	S (type, r	umber of weekly contact hour	s, language — if other than Gei	man)		
Plasma English Kosmo Kompa hours), during	-Astrop , once logie (C ktsemi Germa semest	ohysik (Plasma-Astroph a year (summer semes Cosmology): V (3 weekly nar Hochenergie-Astrop n or English, details or ter break)	ysics): V (3 weekly con ter) / contact hours) + Ü/P ohysik (Block Taught Se availability to be anno	tact hours) + Ü/P (1 (1 weekly contact ho eminar High Energy A bunced (block taught	weekly contact hour) ur), German or Englis Astrophysics): S (2 w t seminar (3 days), u), German or sh reekly contact sually held
Method module is	d of ass creditab	s essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
This mo 1. Topio tes) o repo 2. Semi	odule h cs cove or oral rt (appi inar: ta	as the following asses red in lectures and exe examination of one car rox. 8 pages) lk (approx. 30 to 45 min	sment components rcises: written examina ididate each or oral exa nutes)	ation (approx. 90 min amination in groups	nutes) or talk (appro (approx. 30 minutes	x. 30 minu-) or project
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Details on when assessment component 2 will be offered to be announced. Lectures and exercises will cover either plasma-astrophysics or cosmology (as announced by or agreed upon with the lecturer).						
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	irs in				
Master's wi	ith 1 majo	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	exam. reg. Sik - 2011	page 259 / 296

Module title					Abbreviation		
FOKUS	FOKUS Research Module High Energy Astrophysics with Mini Research Project 11-FM-HAS-MF-111-mo1						
Module	e coord	inator		Module offered by	у		
chairpe	erson o	f examination committ	ee	Faculty of Physics a	ind Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
16	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ester	graduate	11-A4, 11-KET				
Conten	nts						
Specifi sics.	Specific and advanced knowledge for independent scientific work in the research area of High-Energy Astrophy- sics.						
Intend	ed lear	ning outcomes					
The stu Astrop are abl obtain	udents hysics. le to ap ed resu	have special and advar They are able to reproc ply the acquired metho lts.	nced knowledge of inde duce and summarise th ods, to conduct and eva	ependent scientific w e acquired knowledg Iluate astrophysical	vork in the field of Hi ge in an oral present experiments and to p	gh-Energy ation. They present the	
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)			
 Plasma-Astrophysik (Plasma-Astrophysics): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester) Kosmologie (Cosmology): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English Kompaktseminar Hochenergie-Astrophysik (Block Taught Seminar High Energy Astrophysics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break) Astrophysikalisches Praktikum (Practical Course Astrophysics): P (4 weekly contact hours) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) This module has the following assessment components Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or project 							
 2. Seminar: talk (approx. 30 to 45 minutes) 3. Lab course (research project): a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. Students will be given one opportunity to repeat experiments they did not pass. Or b) discussion to test the students' understanding of the physics-related contents and results of the experiment (approx. 20 minutes). Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment component 2 will be offered to be announced. 							
with the lecturer).							
Allocation of places							
WORKIC	au						
L							
Master's w	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 Aaster (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 261 / 296	

Teaching cycle

Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module appears in

Master's with 1 major FOKUS Physics (2011)	
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Module title				Abbreviation	
FOKUS Research Module Spectroscopy and Nano-Optics					11-FM-NOS-F-111-m01
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committee	_	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate	11-KM, 11-TQM		
Conten	ts				
Specific special cies.	c and a ist field	dvanced knowledge of ir I of Nano-Optics, reprodu	dependent scientific Iction of knowledge,	work in a current react react acquisition of social	search area, especially in the and methodological competen-
Intende	ed leari	ning outcomes			
The stu especia methoc	dents l ally in t Is and	nave special and advance he field of nano-optics, a to summarise a sub-area	ed knowledge of inde nd are able to reprod of the current resear	pendent scientific w uce the acquired kn ch area in an oral pro	rork in a current research area, owledge, to apply the acquired esentation.
Course	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
 Festkörper-Spektroskopie (Solid State Spectroscopy): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester) Kompaktseminar Nano-Optik und Spektroskopie (Block Taught Seminar Nano-Optics and Spectroscopy): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) This module has the following assessment components Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or project 					
 2. Seminar: talk (approx. 30 to 45 minutes) Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the summer semester; details on when assessment component 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2. 					
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	ars in			
Master's degree (1 major) FOKUS Physics (2010)					

Master's with 1 major FOKUS Physics (2011)





Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)

Module title					Abbreviation	
FOKUS Research Module Nano-Optics and Spectroscopy					11-FM-NOS-N-111-m	01
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committ	ee	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	ts					
Specifi special logical	c and a ist field compe	dvanced knowledge of d of Nano-Optics and S tencies.	independent scientific pectroscopy, reproduct	c work in a current re tion of knowledge, ad	search area, especia cquisition of social a	ally in the and methodo-
Intende	ed lear	ning outcomes				
The stu especia apply t	Idents ally in t he acqu	have special and advar he field of nano-optics uired methods and to s	nced knowledge of inde and spectroscopy, and ummarise a sub-area o	ependent scientific w l are able to reproduc of the current researc	ork in a current rese ce the acquired know h area in an oral pre	earch area, wledge, to sentation.
None	S (type, r	lumber of weekly contact hour	s, language — If other than Ge	rman)		ich anco o
vear (su Kompa lish, de	ummer ktsemi etails o	ano-Optics): V (2 week semester) nar Nano-Optik (Block n availability to be ann	Taught Seminar Nano-(ounced (block taught s	Optics): S (2 weekly contact no Optics): S (2 weekly c eminar (3 days), usu	contact hours), Germ ally held during sem	isn, once a ian or Eng- iester break)
Methoo module is	d of ass creditab	sessment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
This mo 1. Topio tes) o repo 2. Semi	odule h cs cove or oral rt (app inar: ta	as the following asses red in lectures and exe examination of one car rox. 8 pages) lk (approx. 30 to 45 mi	sment components rcises: written examina ndidate each or oral exa nutes)	ation (approx. 90 mir amination in groups	nutes) or talk (appro (approx. 30 minutes	x. 30 minu-) or project
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Students must meet certain prerequisites to qualify for admission to assessment component 1. The lecturer will inform them about the respective details at the beginning of the course. Assessment component 1 will be offered once a year in the summer semester; details on when assessment com- ponent 2 will be offered to be announced.						
Allocat	ion of j	olaces	·	•	•	
Additio	nal inf	ormation				
Workload						
Referred to in IPO I (avamination regulations for teaching degree programmer)						
module	- appea	u 5 III				
Master's wi	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record M	g • generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 265 / 296

Module title				Abbreviation		
FOKUS Research Module				11-FM4-112-m01		
Module	coord	inator		Module offered by		
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Specifi	c and a	dvanced knowledge of in	dependent scientific	work in a current re	search area.	
Intende	ed learr	ning outcomes				
The stu They ha ply the	dents ł ive ma: acquire	nave special and advance stered the basics in theo ed methods and to summ	ed knowledge of inde ry and practice. They aarise a topic of the s	pendent scientific w are able to reproduc elected research are	ork in a current research area. e the acquired knowledge, to ap- a in an oral presentation.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
FOKUS contact FOKUS on avai	Vorlesı hours) Kompa lability	ung zu aktuellen Forschu) + Ü/P (1 weekly contact ktseminar (FOKUS Block to be announced	ngsthemen (FOKUS L hour), German or Eng Taught Seminar): S (:	ecture on Topics in C clish, details on avai 2 weekly contact hou	Current Research): V (2 weekly lability to be announced urs), German or English, details	
Method module is	l of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
This mo 1. Topic tes) c repoi 2. Semi	odule h cs cove or oral (rt (appr nar: ta	as the following assessm red in lectures and exerc examination of one candi ox. 8 pages) lk (approx. 30 to 45 minu	ient components ises: written examina idate each or oral exa tes)	tion (approx. 90 mir mination in groups	nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project	
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Allocat	ion of p	olaces				
Additio	nal info	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master'	Master's degree (1 major) FOKUS Physics (2010)					
Master'	s degre	ee (1 major) FOKUS Physi	cs (2011)			
Master's degree (1 major) FUKUS Physics (2006)						

Module title				Abbreviation	
FOKUS Research Module			11-FM6-112-m01		
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Specifi	c and a	dvanced knowledge of in	dependent scientific	work in a current re	search area.
Intende	ed learn	ning outcomes			
The stu They ha ply the	dents l ave mas acquire	nave special and advance stered the basics in theo ed methods and to summ	ed knowledge of inde ry and practice. They parise a topic of the s	pendent scientific w are able to reproduc elected research are	ork in a current research area. e the acquired knowledge, to ap- a in an oral presentation.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
FOKUS contact FOKUS on avai	Vorlesı hours) Kompa lability	ung zu aktuellen Forschu) + Ü/P (1 weekly contact ktseminar (FOKUS Block to be announced	ngsthemen (FOKUS L hour), German or Eng Taught Seminar): S (:	ecture on Topics in C clish, details on avai 2 weekly contact hou	Current Research): V (3 weekly lability to be announced urs), German or English, details
Methoo module is	l of ass creditab	e ssment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
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Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
Teachir	ng cycl	9			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Master' Master' Master'	Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)				

Module title				Abbreviation		
FOKUS Research Module				11-FM8-112-m01		
Module co	ordinator		Module offered by			
chairperso	on of examination committ	ee	Faculty of Physics a	nd Astronomy		
ECTS M	ethod of grading	Only after succ. con	npl. of module(s)			
12 NU	umerical grade					
Duration	Module level	Other prerequisites				
1 semeste	r graduate					
Contents						
Specific ar	nd advanced knowledge o	independent scientific	work in a current re	search area.		
Intended l	learning outcomes					
The studer They have ply the acc	nts have special and adva mastered the basics in th quired methods and to sur	nced knowledge of inde eory and practice. They amarise a topic of the s	ependent scientific w are able to reproduc elected research are	vork in a current research area. The acquired knowledge, to ap- ta in an oral presentation.		
Courses (ty	ype, number of weekly contact hou	s, language — if other than Ge	rman)			
FOKUS Vor contact ho FOKUS Kor on availab	rlesung zu aktuellen Forsc ours) + Ü/P (2 weekly conta mpaktseminar (FOKUS Blo oility to be announced	nungsthemen (FOKUS L ct hours), German or E ck Taught Seminar): S (ecture on Topics in (nglish, details on ava 2 weekly contact ho	Current Research): V (4 weekly ailability to be announced urs), German or English, details		
Method of module is created	f assessment (type, scope, lan ditable for bonus)	uage — if other than German,	examination offered — if no	t every semester, information on whether		
This modu 1. Topics c tes) or o report (a 2. Seminal	ale has the following asses covered in lectures and ex- oral examination of one ca approx. 8 pages) r: talk (approx. 30 to 45 mi	sment components rcises: written examina ididate each or oral exa nutes)	ation (approx. 90 min amination in groups	nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project		
Assessme Students r Details on To pass th	nt components 1 and 2 wi must register for assessme when assessment compo is module, students must	be offered in German nt components 1 and 2 nents will be offered to pass both assessment	or English. online (details to be be announced. component 1 and as	e announced). sessment component 2.		
Allocation	of places		· · · ·			
Additional	linformation					
Workload						
Teaching o	cycle					
Referred to	o in LPO I (examination regulat	ons for teaching-degree progra	immes)			
Module ap	Module appears in					
Master's d	legree (1 major) FOKUS Ph	sics (2010)				
Master's d	legree (1 major) FOKUS Ph	sics (2011)				
Master's degree (1 major) FOKUS Physics (2006)						

Module title					Abbreviation	
FOKUS Research Module with Mini Research Project			11-FM4-MF-112-m01			
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committe	e	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
12	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Specifi	c and a	dvanced knowledge of	independent scientific	work in a current re	search area.	
Intende	ed learı	ning outcomes				
They ha ply the are abl in a rep Course	ave ma: acquire e to suc port. s (type, n	stered the basics in the ed methods and to sum ccessfully implement th	ory and practice. They marise a topic of the s le acquired methods ir , language — if other than Ger	are able to reproduct selected research are a mini research pro	e the acquired know a in an oral presenta ject and to write dov	vn the results
FOKUS contact FOKUS on avai FOKUS tails on	Vorlesi t hours) Kompa lability Minifor availa	ung zu aktuellen Forsch) + Ü/P (1 weekly conta ktseminar (FOKUS Bloc to be announced rschungsprojekt (FOKUS bility to be announced	ungsthemen (FOKUS L et hour), German or En k Taught Seminar): S (S Mini Research Projec	ecture on Topics in C glish, details on avai 2 weekly contact hou t): P (2 weekly conta	Current Research): V lability to be annour urs), German or Engl ct hours), German or	(2 weekly nced ish, details ^r English, de-
Method module is	d of ass creditab	e essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
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Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
 Modulo appears in						
mouule	ahhea	a 3 III				
Master's wi	ith 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record M	• generated 26-Aug-2024 • 6 Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 270 / 296

Module title					Abbreviation	
FOKUS Research Module with Mini Research Project			11-FM6-MF-112-m01			
Module	e coord	inator		Module offered by		
chairpe	erson o	f examination committe	e	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
14	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Specifi	c and a	dvanced knowledge of	independent scientific	work in a current re	search area.	
Intende	ed learı	ning outcomes				
They ha ply the are able in a rep Course	ave mai acquire e to sue port. s (type, n	ave special and advant stered the basics in the ed methods and to sum ccessfully implement th umber of weekly contact hours	ory and practice. They marise a topic of the s e acquired methods ir , language — if other than Ger	are able to reproduce selected research are a mini research pro	e the acquired know a in an oral presenta ject and to write dov	vledge, to ap- ation. They vn the results
FOKUS contact FOKUS on avai FOKUS tails on	Vorles t hours) Kompa lability Minifon availa	ung zu aktuellen Forsch) + Ü/P (1 weekly contac ktseminar (FOKUS Bloc to be announced rschungsprojekt (FOKU bility to be announced	ungsthemen (FOKUS L st hour), German or En k Taught Seminar): S (S Mini Research Projec	ecture on Topics in C glish, details on avai 2 weekly contact hou t): P (2 weekly conta	Current Research): V lability to be annour urs), German or Engl ct hours), German or	(3 weekly nced ish, details ^r English, de-
Methoo module is	d of ass creditab	e essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
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Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
mouule	ahheg	115 III				
Master's wi	ith 1 majoi	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • 6 Master (120 ECTS) FOKUS Phys	exam. reg. ;ik - 2011	page 272 / 296

Module ti	itle	Abbreviation			
FOKUS Research Module with Mini Research Project				11-FM8-MF-112-m01	
Module c	oordinator		Module offered by		
chairpers	on of examination committe	2	Faculty of Physics a	nd Astronomy	
ECTS N	Nethod of grading	Only after succ. con	npl. of module(s)		
16 n	umerical grade				
Duration	Module level	Other prerequisites			
1 semeste	er graduate				
Contents					
Specific a	and advanced knowledge of i	ndependent scientific	work in a current res	search area.	
Intended	learning outcomes				
They have ply the ac are able t in a repor	e mastered the basics in the e mastered the basics in the cquired methods and to sum to successfully implement the rt.	and practice. They marise a topic of the s acquired methods ir	are able to reproduc elected research are a mini research pro	e the acquired know a in an oral presenta ject and to write dov	arch area. /ledge, to ap- ation. They vn the results
EOKUS Va	orlocupa zu aktuallan Forsch	ingesthomon (EOVIIS I	acture on Tonics in (urrent Pacaarch), V	(, wookly
contact h FOKUS Kc on availal FOKUS Mi tails on av	ours) + Ü/P (2 weekly contac ompaktseminar (FOKUS Block bility to be announced iniforschungsprojekt (FOKUS vailability to be announced	t hours), German or Ei Taught Seminar): S (Mini Research Projec	nglish, details on ava 2 weekly contact hou t): P (2 weekly contac	ailability to be annou urs), German or Engl ct hours), German or	ish, details r English, de-
Method o module is cre	If assessment (type, scope, langu editable for bonus)	age — if other than German, o	examination offered — if no	t every semester, informati	on on whether
This mode 1. Topics tes) or report (2. Semina 3. Resear	ule has the following assess covered in lectures and exer oral examination of one cand (approx. 8 pages) ar: talk (approx. 30 to 45 min ch project: project report (ap	ment components cises: written examina lidate each or oral exa utes) prox. 8 pages)	ation (approx. 90 mir amination in groups (nutes) or talk (appro (approx. 30 minutes)	x. 30 minu-) or project
Assessme Students Details or To pass th	ent components 1 and 3 will must register for assessmen n when assessment compon his module, students must p	be offered in German t components 1 and 3 ents will be offered to ass each of the asses:	or English. online (details to be be announced. sment components 1	announced). through 3.	
Allocation	n of places				
Additiona	al information				
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
-					
Module a	ppears in				
Master's with 1	1 major FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	xam. reg. ik - 2011	page 274 / 296

Module title				Abbreviation	
FOKUS Research Module					11-FM4A-112-m01
Module	coord	inator		Module offered by	
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
8	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Specifi	c and a	dvanced knowledge of ir	dependent scientific	work in a current re	search area.
Intende	ed learr	ning outcomes			
The stu They ha ply the	dents ł ive ma: acquire	nave special and advance stered the basics in theo ed methods and to summ	ed knowledge of inde ry and practice. They parise a topic of the s	pendent scientific w are able to reproduc elected research are	ork in a current research area. e the acquired knowledge, to ap- a in an oral presentation.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
FOKUS contact FOKUS on avai	Vorlesı hours) Kompa lability	ung zu aktuellen Forschu) + Ü/P (1 weekly contact ktseminar (FOKUS Block to be announced	ngsthemen (FOKUS L hour), German or Eng Taught Seminar): S (:	ecture on Topics in C glish, details on avai 2 weekly contact hou	Current Research): V (2 weekly lability to be announced urs), German or English, details
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Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teachir	ng cycl	9			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	in			
Master Master Master	Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)				

Module title					Abbreviation
FOKUS Research Module					11-FM6A-112-m01
Module	e coord	inator		Module offered by	
chairpe	erson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Specifi	c and a	dvanced knowledge of ir	dependent scientific	work in a current re-	search area.
Intende	ed learn	ning outcomes			
The stu They ha ply the	dents ł ave mas acquire	nave special and advance stered the basics in theo ed methods and to summ	ed knowledge of inde ry and practice. They parise a topic of the s	pendent scientific w are able to reproduc elected research are	york in a current research area. The the acquired knowledge, to ap- the in an oral presentation.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
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Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
Teachir	ng cycl	9			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
	_				
Module	Module appears in				
Master	's degre	ee (1 major) FOKUS Physi	cs (2010)		
Master	's degre	ee (1 major) FOKUS Physi	cs (2011)		
master	Master's degree (1 major) FUKUS Physics (2006)				

Module title				Abbreviation		
FOKUS Research Module			11-FM8A-112-m01			
Module	coord	inator		Module offered by		
chairpe	erson of	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
12	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Specifi	c and a	dvanced knowledge of in	dependent scientific	work in a current re-	search area.	
Intende	ed learn	ning outcomes				
The stu They ha ply the	dents ł ave mas acquire	nave special and advance stered the basics in theo ed methods and to summ	ed knowledge of inde ry and practice. They parise a topic of the s	pendent scientific w are able to reproduc elected research are	ork in a current research area. e the acquired knowledge, to ap- a in an oral presentation.	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
FOKUS contact FOKUS on avai	Vorlesı : hours) Kompa lability	ung zu aktuellen Forschu) + Ü/P (2 weekly contact ktseminar (FOKUS Block to be announced	ngsthemen (FOKUS L hours), German or Er Taught Seminar): S (:	ecture on Topics in C nglish, details on ava 2 weekly contact hou	Current Research): V (4 weekly ailability to be announced urs), German or English, details	
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Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	9				
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)		
Module	e appea	in a state of the				
Master Master Master	Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011) Master's degree (1 major) FOKUS Physics (2006)					

Module title		Abbreviation			
FOKUS Mini Research Project				11-FM4A-MF-112-mc)1
Module coor	dinator		Module offered by		
chairperson	of examination committe	2	Faculty of Physics a	nd Astronomy	
ECTS Met	hod of grading	Only after succ. con	npl. of module(s)		
12 num	erical grade				
Duration	Module level	Other prerequisites			
1 semester	graduate				
Contents					
Specific and	advanced knowledge of i	ndependent scientific	work in a current res	search area.	
Intended lea	rning outcomes				
The students They have m ply the acqu are able to s in a report.	s have special and advance astered the basics in theorized ired methods and to sum uccessfully implement the	ed knowledge of inde ory and practice. They marise a topic of the s e acquired methods ir	pendent scientific w are able to reproduc elected research are a mini research pro	ork in a current rese e the acquired know a in an oral presenta ject and to write dov	arch area. /ledge, to ap- ation. They vn the results
Courses (type	, number of weekly contact hours,	language — if other than Ger	rman)		
FOKUS Vorle contact hour FOKUS Komp on availabili FOKUS Minif tails on avai	sung zu aktuellen Forschi rs) + Ü/P (1 weekly contac baktseminar (FOKUS Block ty to be announced forschungsprojekt (FOKUS lability to be announced	ungsthemen (FOKUS L t hour), German or Eng c Taught Seminar): S (Mini Research Projec	ecture on Topics in C glish, details on avai 2 weekly contact hou t): P (2 weekly contac	Current Research): V lability to be annour urs), German or Engl ct hours), German or	(2 weekly nced ish, details r English, de-
Method of a module is credit	ssessment (type, scope, langu able for bonus)	age — if other than German, '	examination offered — if no	t every semester, informati	ion on whether
This module 1. Topics cov tes) or ora report (ap 2. Seminar: 1 3. Research	has the following assess vered in lectures and exer l examination of one cano prox. 8 pages) calk (approx. 30 to 45 min project: project report (ap	ment components cises: written examina lidate each or oral exa utes) prox. 8 pages)	ation (approx. 90 mir amination in groups (nutes) or talk (appro (approx. 30 minutes)	x. 30 minu-) or project
Assessment Students mu Details on w To pass this	components 1 and 3 will ist register for assessmen hen assessment compon module, students must p	be offered in German t components 1 and 3 ents will be offered to ass each of the asses	or English. online (details to be be announced. sment components 1	announced). through 3.	
Allocation of	fplaces				
Additional in	formation				
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module app	ears in				
NA +					
waster's with 1 ma	JUI FUKUS PRYSICS (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e laster (120 ECTS) FOKUS Phys	ik - 2011	page 279 / 296

Module title					Abbreviation	
FOKUS Research Module with Mini Research Project			11-FM6A-MF-112-mc)1		
Module	e coord	inator		Module offered by		
chairpe	erson of	examination committ	ee	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
14	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Specifi	c and a	dvanced knowledge of	independent scientific	work in a current re	search area.	
Intende	ed learr	ning outcomes				
They ha ply the are able in a rep Course FOKUS	ave mas acquire e to suc port. s (type, n Vorlesu	stered the basics in the ed methods and to sun ccessfully implement the umber of weekly contact hour ung zu aktuellen Forsch	eory and practice. They marise a topic of the s ne acquired methods ir s, language – if other than Gen nungsthemen (FOKUS L	are able to reproduc elected research are a mini research pro man) ecture on Topics in C	e the acquired know a in an oral presenta ject and to write dov	(3 weekly
contact FOKUS on avai FOKUS tails on	t hours) Kompa ilability Minifor availa	+ Ü/P (1 weekly conta ktseminar (FOKUS Bloc to be announced schungsprojekt (FOKU bility to be announced	ct hour), German or En ck Taught Seminar): S (S Mini Research Projec	glish, details on avai 2 weekly contact hou t): P (2 weekly conta	lability to be annour urs), German or Engl ct hours), German or	iced ish, details ^r English, de-
Methoo module is	d of ass creditab	essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
This mo 1. Topic tes) o repor 2. Semi 3. Rese	odule h cs cove or oral e rt (appr inar: ta arch pr	as the following asses red in lectures and exe examination of one car rox. 8 pages) lk (approx. 30 to 45 mi oject: project report (a	sment components rcises: written examina ididate each or oral exa nutes) pprox. 8 pages)	ation (approx. 90 mir amination in groups	nutes) or talk (appro (approx. 30 minutes)	x. 30 minu-) or project
Assess Studen Details To pass	ment co ts mus on whe s this m	omponents 1 and 3 wil t register for assessme en assessment compol odule, students must	be offered in German nt components 1 and 3 nents will be offered to pass each of the asses	or English. online (details to be be announced. sment components 1	announced). through 3.	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	rs in				
Master's wi	ith 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	xam. reg. ik - 2011	page 281 / 296

Module title					Abbreviation	
FOKUS Research Module with Mini Research Project				11-FM8A-MF-112-mc)1	
Module	e coord	inator		Module offered by		
chairpe	erson of	examination committe	ee	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
16	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Specifi	c and a	dvanced knowledge of	independent scientific	work in a current re	search area.	
Intende	ed learr	ning outcomes				
They ha ply the are able in a rep Course FOKUS	ave mas acquire e to suc port. s (type, n Vorlesu	umber of weekly contact hour	eory and practice. They marise a topic of the s ne acquired methods ir s, language – if other than Gen nungsthemen (FOKUS L	are able to reproduc elected research are a mini research pro man) ecture on Topics in C	e the acquired know a in an oral presenta ject and to write dow	/ledge, to ap- ation. They vn the results (4 weekly
contact FOKUS on avai FOKUS tails on	t hours) Kompa ilability Minifor availa	+ U/P (2 weekly conta ktseminar (FOKUS Bloo to be announced schungsprojekt (FOKU bility to be announced	ct hours), German or E ck Taught Seminar): S (S Mini Research Projec	nglish, details on ava 2 weekly contact hou t): P (2 weekly conta	ailability to be annou urs), German or Engl ct hours), German or	unced ish, details r English, de-
Methoo module is	d of ass creditab	essment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether
This mo 1. Topio tes) o repo 2. Semi 3. Rese	odule h cs cove or oral e rt (appr inar: ta arch pr	as the following asses red in lectures and exe examination of one car rox. 8 pages) lk (approx. 30 to 45 mi oject: project report (a	sment components rcises: written examina ididate each or oral exa nutes) pprox. 8 pages)	ation (approx. 90 mir amination in groups	nutes) or talk (appro (approx. 30 minutes	x. 30 minu-) or project
Assess Studen Details To pass	ment co ts mus on whe s this m	omponents 1 and 3 wil t register for assessme en assessment compor odule, students must	be offered in German nt components 1 and 3 nents will be offered to pass each of the asses	or English. online (details to be be announced. sment components 1	announced). through 3.	
Allocat	ion of p	olaces				
Additio	nal info	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
moaule	e appea	IS IN				
Master's wi	ith 1 major	FOKUS Physics (2011)	JMU Würzburg data record N	• generated 26-Aug-2024 • e Master (120 ECTS) FOKUS Phys	exam. reg. ik - 2011	page 283 / 296

Module title			Abbreviation		
FOKUS Research Module Topological Insulators 11-FM-TI-131-m01					11-FM-TI-131-m01
Module	e coord	inator		Module offered by	
chairpe	erson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
10	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Topolo presen sults.	gical in t and d	sulators are a new class iscuss the principles nec	of materials with spe essary to understand	cial electrical proper I these materials on	ties. In this research module, we the basis of current research re-
Intende	ed lear	ning outcomes			
The stu sulator sub-are	idents i s, and ea of th	have special and advance are able to reproduce the e current research area ir	ed knowledge of inde acquired knowledge n an oral presentatior	ependent scientific w e, to apply the acquir n.	ork in the field of topological in- ed methods and to summarise a
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
kly con Kompa hours), wards t	tact ho ktsemi Germa	port in Halbleiter-Nanost urs) + Ü/P (1 weekly cont nar Topologische Isolato in or English, details on a l of semester break or at i	act hour), German or ren (Block Taught Ser vailability to be anno the beginning of the s	English, once a year minar Topological Insounced (block taught subsequent semeste	sulators): V (3 wee- (summer semester) (sulators): S (2 weekly contact (seminar (1 to 3 days) held to- (r)
Metho	d of ass	Sessment (type, scope, langua	ge — if other than German, e	examination offered — if no	t every semester, information on whether
module is	creditab	le for bonus)			
This mo 1. Topio tes) repo 2. Sem	odule h cs cove or oral rt (appi inar: ta	as the following assessm red in lectures and exerc examination of one cand rox. 8 pages) lk (approx. 30 to 45 minu	nent components ises: written examina idate each or oral exa tes)	ation (approx. 90 mir amination in groups	nutes) or talk (approx. 30 minu- (approx. 30 minutes) or project
Assess Studen Assess ponent To pass	ment c ts mus ment c 2 will l s this m	omponents 1 and 2 will b t register for assessment omponent 1 will be offere be offered to be announc nodule, students must pa	e offered in German o components 1 and 2 ed once a year in the s ed. ss both assessment	or English. online (details to be summer semester; d component 1 and as	e announced). etails on when assessment com- sessment component 2.
Allocat	ion of _l	olaces			
Additio	nal inf	ormation			
Workload					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	e appea	nrs in			
Bachelor' degree (1 major) Nanostructure Technology (2010)					

Master's with 1 major FOKUS Physics (2011)





Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

Module	title		Abbreviation							
FOKUS	Resear	rch Module Topology in S		11-FM-TFP-141-m01						
Module coordinator				Module offered by						
chairperson of examination committee			Faculty of Physics and Astronomy							
ECTS Method of grading		Only after succ. compl. of module(s)								
10	nume	rical grade								
Duration		Module level	Other prerequisites							
1 semester		graduate								
Conten	ts									
Specific and advanced knowledge of independent scientific work in a current research area, especially in the specialist field.										
Intended learning outcomes										
The students have special and advanced knowledge of independent scientific work in a current research area.										
Courses (type, number of weekly contact hours, language — if other than German)										
Topologie in der Festkörperphysik (Topology in Solid State Physics): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester) Kompaktseminar Topologie in der Festkörperphysik (Block Taught Seminar Topology in Solid State Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)										
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether										
module is creditable for bonus)										
 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 										
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the summer semester; details on when assessment com- ponent 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.										
Allocat	ion of p	olaces								
 Additional information										
Workload										
Teaching cycle										
Referred to in LPO I (examination regulations for teaching-degree programmes)										
Module	appea	in and the second se								
Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)										

Module	title		Abbreviation						
FOKUS	Resear	ch Module Topology in	11-FM-TFP-MF-141-m01						
Project									
Module	coord	inator		Module offered by					
chairperson of examination committee				Faculty of Physics and Astronomy					
ECTS	Metho	od of grading	Only after succ. compl. of module(s)						
14	nume	rical grade							
Duration		Module level	Other prerequisites						
1 semester		graduate							
Contents									
Specific and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of topology in Solid-State Physics.									
Intended learning outcomes									
The students have special and advanced knowledge of independent scientific work in a current research area of topology of Solid-State Physics.									
Courses (type, number of weekly contact hours, language — if other than German)									
Topologie in der Festkörperphysik (Topology in Solid State Physics): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester) Kompaktseminar Topologie in der Festkörperphysik (Block Taught Seminar Topology in Solid State Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break) Miniforschungsprojekt Topologie in der Festkörperphysik (Mini Research Project Topology in Solid State Phy- sics): P (2 weekly contact hours), German or English, details on availability to be announced (either block taught during semester break or approx. 3 weeks part time) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minu- tes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 3. Research project: project report (approx. 8 pages) Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Assessment component 1 will be offered once a year in the summer semester; details on when assessment com- ponents 2 and 3 will be offered to be announced.									
Allocation of places									
Additional information									
Workload									
Teaching cycle									
Referred to in LPO I (examination regulations for teaching-degree programmes)									
Master's with 1 major FOKUS Physics (2011) JMU Würzburg • generated 26-Aug-2024 • exam. re data record Master (120 ECTS) FOKUS Physik - 201				exam. reg. iik - 2011	page 288 / 296				
Module appears in

Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

Master's with 1 major FOKUS	Physics (2011)	
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Module title			Abbreviation			
FOKUS Quantum Information Technology			11-FM-QUI-132-m01			
Module coordinator		Module offered by				
Managing Director of the Institute of Applied Ph		Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten	ts					
Basic c proach and qu	oncept es towa antum	s of quantum mechani ards quantum computi noise, quantum inform	cs, quantum bits and a ng (on the basis of pho ation and communicat	lgorithms, quantal m tons, ions and nucle ion.	neasurements, expen ar spins), quantum o	rimental ap- operations
Intende	ed lear	ning outcomes				
The stu mation area of and me	dents , they a the cu ethods	have special and advar are able to reproduce th rrent research area in a in a mini research proje	nced knowledge of inde ne acquired knowledge n oral presentation an ect.	ependent scientific w , to apply the acquire d to successfully imp	vork in the field of qu ed methods, to sumr lement the acquired	iantum infor- narise a sub- l knowledge
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
Quanteninformationstechnologie (Quantum Information Technology): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (winter semester) Kompaktseminar Quanteninformationstechnologie (Block Taught Seminar Quantum Information Technology): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually hold during comestor broak)						
Methoo module is	d of ass creditab	sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	t every semester, informati	on on whether
 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 						
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- nent 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.						
Allocation of places						
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	ars in				
Master's wi	ith 1 majo	r FOKUS Physics (2011)	JMU Würzburg data record M	s • generated 26-Aug-2024 • 6 Master (120 ECTS) FOKUS Phys	exam. reg. sik - 2011	page 290 / 296

Master's degree (1 major) FOKUS Physics (2011)

Master's with 1 major FOKUS Physics (2011)	JMU Würzburg • generated 26-Aug-2024 • exam. reg.
	data record Master (120 ECTS) FOKUS Physik - 2011

Module title			Abbreviation			
FOKUS Research Module Quantum Information Technology 11-FM-QUI-141-mo1						
Module coordinator		Module offered by				
Managi	ng Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Basic c proach and qu	oncept es towa antum	s of quantum mechani ards quantum computi noise, quantum inform	cs, quantum bits and a ng (on the basis of pho ation and communicat	lgorithms, quantal m tons, ions and nucle ion.	neasurements, expen ar spins), quantum (rimental ap- operations
Intende	ed lear	ning outcomes				
The stu mation area of and me	dents l , they a the cu thods	nave special and advar ire able to reproduce th rrent research area in a in a mini research proje	nced knowledge of inde ne acquired knowledge n oral presentation and ect.	pendent scientific w , to apply the acquire d to successfully imp	vork in the field of qu ed methods, to sum lement the acquired	ıantum infor- narise a sub- l knowledge
Course	S (type, r	umber of weekly contact hour	s, language — if other than Ge	rman)		
Quanteninformationstechnologie (Quantum Information Technology): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (winter semester) Kompaktseminar Quanteninformationstechnologie (Block Taught Seminar Quantum Information Technology): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually hold during comestor broak)						
Method	d of ass	sessment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
module is	creditab	le for bonus)				
 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 						
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- nent 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.						
Allocation of places						
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
waster's wi	un 1 majo	FUKUS PHYSICS (2011)	JMU Wurzburg data record N	• generated 26-Aug-2024 • 6 laster (120 ECTS) FOKUS Phys	sik - 2011	page 292 / 296

Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)

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	data record Master (120 ECTS) FOKUS Physik - 2011	

Module title			Abbreviation		
FOKUS Research Module Density Functional Theory and the Physics of Oxide			11-FM-DFT-142-m01		
Heterostructure					
Module coordinator			Module offered by		
chairperson of examination	on committee		Faculty of Physics a	nd Astronomy	
ECTS Method of gradin	g	Only after succ. com	pl. of module(s)		
8 numerical grade					
Duration Module lev	rel	Other prerequisites			
1 semester graduate		Recommended: 11-C	MS		
Contents					
Concepts and principles of	of density fun	ctional theory.			
Intended learning outcom	nes				
The students know the co	ncepts and p	rinciples of density fu	inctional theory.		
Courses (type, number of week	ly contact hours, l	anguage — if other than Ger	man)		
Dichtefunktionaltheorie und Physik der oxidischen Heterostrukturen (Density Functional Theory and Physics of Oxide Heterostructures): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a ye- ar (winter semester) Kompaktseminar Dichtefunktionaltheorie und Physik der oxidischen Heterostrukturen (Block Taught Seminar Density Functional Theory and Physics of Oxide Heterostructures): S (2 weekly contact hours), German or English,					
Method of assessment (tv	pe. scope. langua	re - if other than German.	examination offered — if no	t every semester, information on whether	
module is creditable for bonus)				····, ··· · · · · · · · · · · · · · · ·	
 This module has the following assessment components 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) 2. Seminar: talk (approx. 30 to 45 minutes) 					
Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment compo- nent 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.					
Allocation of places					
Additional information					
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major)	Master's degree (1 major) FOKUS Physics (2010)				
Master's degree (1 major) FOKUS Physics (2011)					





Thesis (30 ECTS credits)

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Module title			Abbreviation		
Master Thesis FOKUS Physics				11-MA-PF-111-m01	
Module coordinator				Module offered by	
chairpe	erson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
30	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Mostly or Theo	indepe oretical	ndent processing of an e Physics, especially acco	experimental or theor rding to known proce	etical task in a curre dures and scientific	nt research area of Experimental aspects; writing of the thesis.
Intende	ed learr	ning outcomes			
The stu of Theo their re	dents a retical sults in	are able to independently Physics, especially in acc a final paper.	/ work on an experim cordance with known	ental or theoretical t methods and scient	ask from a current research area tific aspects and to summarise
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
no cour	rses as	signed			
Methoo module is	d of ass creditab	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
written thesis Language of assessment: German, English					
Allocat	ion of p	olaces			
Additional information					
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Master's degree (1 major) FOKUS Physics (2011)					