

Module Catalogue

for the Subject

Physics

as a Bachelor's with 1 major with the degree "Bachelor of Science" (180 ECTS credits)

Examination regulations version: 2010 Responsible: Faculty of Physics and Astronomy

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record 82|128|-|-|H|2010

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The subject is divided into

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Content and Objectives of the Programme

The goal of the studies is it to mediate knowledge on the most important subsections of physics and to make the students familiar with the methods of physical 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 basic knowledge in particular necessary for a consecutive Bachelor and Master course of studies. Therefore the main emphasis is put on the understanding of the fundamental experimental and theoretical physical terms and laws as well as on basic scientific methods and the development of the typical scientific thinking and working structures. During the Bachelor thesis the student should work on a 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 under guidance to a large extent independently.

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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)):

19-Jan-2011 (2011-7)

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.

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Compulsory Courses

(117 ECTS credits)

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Experimental Physics

(36 ECTS credits)

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Module title		Abbreviation				
Classic	Classical Physics (Mechanics, Thermodynamics, Waves, Oscillations, Electrici- 11-KP-092-mo1					
ty, Magnetism and Optics)						
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	pl. of module(s)		
16	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate	Bridge course Mathe cal Methods of Phys	ematische Rechenme ics) for first-semeste	ethoden der Physik (er students.	Mathemati-
Conten	ts					
Physica gnetic v tion. Int Non-lin rent. Ma ternatir	al laws vibratio teractic earity a echanis ng curre	of mechanics, thermoo ons and waves, radiatio ons and central forces. and chaos. Mechanics sms of conduction. Ma ent. Electromagnetic wa	ynamics, vibrations, w n and wave optics. Tim General relativity. Mecl of non-rigid bodies. Ga gnetostatics. Electroma aves. Geometric optics.	aves, science of elec le, room and motion hanics of rigid bodie sses. Thermodynami agnetic induction. Ma Wave optics.	tricity, magnetism, e Physical values. Fo s. Friction. Vibration cs. Electrostatics. El axwell equations. Sc	electroma- rce and mo- and waves. ectric cur- ience of al-
Intende	ed learr	ning outcomes				
The stu ves, sci are able knowle	dents u ience o e to ap dge to	understand the basic p f electricity, magnetisn ply mathematical meth the solution of mathen	rinciples and connection, electromagnetic vibra ods to the formulation natical-physical tasks.	ons of mechanics, th ations and waves, ra of physical contexts	ermodynamics, vibra diation and wave op and autonomously a	ations, wa- itics. They apply their
Course	S (type, n	umber of weekly contact hour	s, language — if other than Ger	man)		
Klassis tact ho Klassis contact	che Phy urs) + Ü che Phy hours)	ysik 1 (Mechanik, Welle İ (2 weekly contact hou ysik 2 (Elektromagnetis) + Ü (2 weekly contact	en, Wärme) (Classical P Irs), once a year (winter Smus, Optik) (Classical hours), once a year (su	hysics 1 (Mechanics semester) Physics 2 (Electroma mmer semester)	, Waves, Heat)): V (4 agnetism, Optics)): V	weekly con- / (4 weekly
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 on (a 2. Topic tion (3. Topic minu	odule h s cove pprox. cs cove (approx cs cove ites, us	as the following assess red in lectures and exe 120 minutes). red in lectures and exe (, 120 minutes). red in lectures and exe ually chosen) or written	sment components rcises in part 1 (Klassis rcises in part 2 (Klassis rcises in parts 1 and 2: n examination (approx.	che Physik 1 (Classio sche Physik 2 (Classi oral examination of 120 minutes).	cal Physics 1)): writte cal Physics 2)): writt one candidate each	en examinati- en examina- (approx. 30
Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Klassische Physik 1 (Classical Physics 1) and Klassi- sche Physik 2 (Classical Physics 2). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.						
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 o ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 10 / 250

Additional information
Workload
Teaching cycle
Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
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)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)
No final examination Special study offering (2010)

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Module title Abbreviation					Abbreviation
Condensed Matter (Quanta, Atoms, Molecules, Solid State Physics) 11-KM-092-m01					11-KM-092-m01
Module coordinator				Module offered by	
Manag	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	npl. of module(s)	
16	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
2 seme	ster	undergraduate			
Conten	ts				
Quantu Quantu Atoms mical b (FEG). (propert	Im phei Im Physin exter Conding Crystal sties of i	nomena, introduction to sics. Mathematical formu rnal fields. Many-electror g. Molecule rotations and structure. The reciprocal nsulators. Electrons in a	Atomic Physics and p lation of quantum mo atoms. Optical trans vibrations. Bonding lattice. Structure dete periodic potential.	ohysical laws of solic echanics. Quantum i sitions and spectrose in crystals. Mechani ermination. Lattice v	ls. Experimental principles of mechanics of hydrogen atoms. copy. Laser. Molecules and che- cal properties. Free electron gas ibrations (phonons). Thermal
Intende	ed learı	ning outcomes			
The stu ding ar They ar apply t	idents l id struc re able heir kno	know the basic contexts a sture, lattice dynamics, th to apply mathematical m owledge to the solution o	and principles of qua nermal properties, pri ethods to the formula of mathematical-phys	ntum phenomena, A nciples of electronic ation of modern phy ical tasks.	tomic Physics and solids (bon- properties (free electron gas)). sical contexts and autonomously
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)	
Konder kly con Konder hours)	nsierte tact ho nsierte + Ü (2 V	Materie 1 (Quanten, Aton urs) + Ü (2 weekly contac Materie 2 (Festkörperphy veekly contact hours), or	ne, Moleküle) (Conde t hours), once a year vsik 1) (Condensed Ma nce a year (summer so	nsed Matter 1 (Quan (winter semester) atter 2 (Solid State P emester)	ita, Atoms, Molecules)): V (4 wee- hysics)): V (4 weekly contact
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
This mo 1. Topio amin 2. Topio amin 3. Topio minu Assess Succes ponent To qual Studen Konder	odule h cs cove hation (cs cove hation (cs cove ttes, us ment c sful co s 1 and lify for a ts are h nsierte	as the following assessn red in lectures and exerc approx. 120 minutes). red in lectures and exerc approx. 120 minutes). red in lectures and exerc ually chosen) or written of omponent 3 will be offere mpletion of approx. 50% 2. admission to assessment highly recommended to a Materie 2 (Condensed M	nent components ises in part 1 (Konder ises in part 2 (Konder ises in parts 1 and 2: examination (approx. ed in German; English of practice work each t component 3, stude ttend both courses K atter 2). The topics di	nsierte Materie 1 (Co nsierte Materie 2 (Co oral examination of 120 minutes). n if agreed upon with n is a prerequisite fo ents must pass asses ondensierte Materie scussed in these two	ndensed Matter 1)): written ex- ondensed Matter 2)): written ex- one candidate each (approx. 30 n examiner(s). r admission to assessment com- ssment component 1 and/or 2. 1 (Condensed Matter 1) and o courses will be covered in as-
Studen To pass compo The gra compo	Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.				
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) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
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)
Bachelor' degree (1 major) Mathematical Physics (2009)
Bachelor' degree (1 major) Mathematical Physics (2012)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 13 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation					
Elementary Particle Physi	cs		11-KET-092-m01		
Module coordinator			Module offered by		
rector of the Institute of Ap	oplied Physics	Faculty of Physics and Astronomy			
ECTS Method of grading Only after succ. compl. of module(s)					
erical grade					
Module level	Other prerequisites				
undergraduate	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.				
•					
s of Nuclear and Elementa els. Radioactive decay. St etries. Particle accelerator ent results.	ry Particle Physics. Hi ructure of nuclei. Nuc rs and detectors. Wea	storical introduction lear energy. Quantur k interaction. Strong	n. Scattering and spectroscopy. m theoretical description of par- g interaction, quarks. Standard		
rning outcomes					
s understand the basic cor n overview of the experime	nections between fu ntal observations of I	ndamental Nuclear a Particle Physics and	and Elementary Particle Physics. the theoretical models which de-		
, number of weekly contact hours, I	anguage — if other than Ger	man)			
ormation on SWS (weekly	contact hours) and co	ourse language avail	able)		
ssessment (type, scope, langua able for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
ination (approx. 120 minu ecified)	tes, for modules with	less than 4 ECTS cre	edits approx. 90 minutes; unless		
places					
formation					
Teaching cycle					
Keterred to In LPU I (examination regulations for teaching-degree programmes)					
 Modulo appears in					
Bachelor' degree (1 major) Physics (2010)					
Bachelor' degree (1 major) Athematical Physics (2009) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)					
	Elementary Particle Physi dinator rector of the Institute of Aphod of grading erical grade Module level undergraduate s of Nuclear and Elementa lels. Radioactive decay. St tetries. Particle accelerator ent results. ming outcomes s understand the basic cor n overview of the experime , number of weekly contact hours, 1 ormation on SWS (weekly of sessment (type, scope, langua able for bonus) nination (approx. 120 minu becified) f places formation able for bonus) nination (approx. 120 minu becified) f places n LPO I (examination regulation ears in gree (1 major) Physics (20 gree (1 major, 1 minor) Ph	Elementary Particle Physics dinator rector of the Institute of Applied Physics hod of grading Only after succ. com erical grade Module level Other prerequisites certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the sessment into effect ted to assessment into effect ted to assessment a later of admission to assess so of Nuclear and Elementary Particle Physics. Hi lels. Radioactive decay. Structure of nuclei. Nuclearent results. rning outcomes a understand the basic connections between fun overview of the experimental observations of I , number of weekly contact hours, language — if other than Germ ormation on SWS (weekly contact hours) and cc sessesment (type, scope, language — if other than German, e able for bonus) thation (approx. 120 minutes, for modules with tecified) f places formation formation figure (1 major) Physics (2010) gree (1 major) Physics (2010) gree (1 major, 1 minor) Physics (Minor, 2010)	Module offered by Module offered by rector of the Institute of Applied Physics Faculty of Physics a nod of grading Only after succ. compl. of module(s) erical grade		

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Theoretical Physics

(32 ECTS credits)

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

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 15 / 250
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Module title				Abbreviation		
Statistical Mechanics, Thermodynamics and Electrodynamics				ics	11-STE-092-m01	
Module coordinator			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)		
16	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
2 seme	ster	undergraduate	10-M1-PHY and 10-N	12-PHY or 10-M1-NST	and 10-M2-NST	
Conten	ts					
Principl ticles, c namics	es of S ritical of elec	tatistical Physics: Ideal phenomena, Maxwell ec tromagnetic fields. Spe	systems. Thermodyna quations, electrostatic cial relativity.	mics: Quantum stat s, magnetostatics, N	istics, systems of inf Aaxwell equations in	eracting par- matter, dy-
Intende	ed leari	ning outcomes				
The stu trodyna method	dents l imics, t ls and i	nave advanced knowled hermodynamics and sta are able to independent	ge of the methods of ⁻ atistical mechanics. Th ly apply them to the d	Theoretical Physics. hey are familiar with escription and solut	They know the princ the corresponding c ion of problems in th	iples of elec- alculation nis area.
Courses	5 (type, n	umber of weekly contact hours,	language — if other than Ger	rman)		
Statistis hours) - Theoret hours),	sche M + Ü (2 v ische E once a	lechanik und Thermodyr weekly contact hours), o Elektrodynamik (Theoret y year (summer semeste	namik (Statistical Mec nce a year (winter sen ical Electrodynamics) r)	hanics and Thermod nester) : V (4 weekly contact	lynamics): V (4 week : hours) + Ü (2 weekl	ly contact y contact
Method	l of ass	sessment (type, scope, langu	age — if other than German, (examination offered — if no	t every semester, informat	ion on whether
module is	creditab	le for bonus)				
This mc 1. Topic chan 2. Topic mics) 3. Topic minu	 This module has the following assessment components 1. Topics covered in lectures and exercises in part 1 (Statistische Mechanik und Thermodynamik (Statistical Mechanics and Thermodynamics)): written examination (approx. 120 minutes). 2. Topics covered in lectures and exercises in part 2 (Theoretische Elektrodynamik (Theoretical Electrodynamics)): written examination (approx. 120 minutes). 3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes). 					
Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment com- ponents 1 and 2. Students are highly recommended to attend both courses Statistische Mechanik und Thermodynamik (Statisti- cal Mechanics and Thermodynamics) and Theoretische Elektrodynamik (Theoretical Electrodynamics). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3.						
Allocati	ion of r	places				
			-			
Additio	nal inf	ormation				
Worklo	Workload					
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 16 / 250

Teaching cycle

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

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Module appears in

Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)

Bachelor' degree (1 major) Physics (2010)

Bachelor' degree (1 major) Physics (2012)

Bachelor' degree (1 major) Nanostructure Technology (2010)

Bachelor' degree (1 major) Mathematical Physics (2009)

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

Bachelor' degree (1 major) Computational Mathematics (2012)

Bachelor' degree (1 major) Computational Mathematics (2013)

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 17 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Theoretical Mechanics and Quantum Mechanics 11-TQM-092-m01					11-TQM-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Theoretical Physics and Astrophysics			eoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
16	nume	rical grade				
Duratio	n	Module level	Other prerequisites	;		
2 seme	ster	undergraduate	10-M1-PHY, 10-M2-F	PHY and 11-MPI-3 or 1	o-M1-NST, 10-M2-NST and MPI-3	
Conten	ts					
Newton Probler Limits c cillator. ny-part	iian me ns of co of class . Angul icle sys	echanics. Lagrangian and entral forces, minor vibra ical physics. Schrödinge ar momentum and spin. stems.	Hamiltonian formali tions, rigid body, mo r equation, mathema Hydrogen atom. Metl	sm. Symmetries and tion in electromagne tical principles of qu nods of approximatic	conservation laws. Applications: etic fields. Relativistic dynamics. aantum mechanics, harmonic os- on. Motion in electric fields. Ma-	
Intende	ed leari	ning outcomes				
The stu miliar w of quar of Theo cal con	dents l vith the itum th retical cepts.	nave gained first experien e principles of theoretical eory. They are able to ap Physics and to interpret	nces concerning the mechanics and their ply the acquired calc the results. They hav	working methods of ⁻ r different formulatio ulation methods and e especially acquired	Theoretical Physics. They are fa- ns and understand the principles d techniques to simple problems d knowledge of basic mathemati-	
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ge	rman)		
Theoret year (w Quante (summ	Theoretische Mechanik (Theoretical Mechanics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter semester) Quantenmechanik (Quantum Mechanics): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year					
Methoo module is	l of ass creditab	essment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	t every semester, information on whether	
This mo 1. Topic amin 2. Topic tion (3. Topic minu	odule h cs cove ation (cs cove (appro) cs cove ites, us	as the following assessn red in lectures and exerc approx. 120 minutes). red in lectures and exerc (. 120 minutes). red in lectures and exerc ually chosen) or written (nent components ises in part 1 (Theore ises in part 2 (Quant ises in parts 1 and 2: examination (approx	tische Mechanik (Th enmechanik (Quantu oral examination of . 120 minutes).	eoretical Mechanics)): written ex- ım Mechanics)): written examina- one candidate each (approx. 30	
Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Theoretische Mechanik (Theoretical Mechanics) and Quantenmechanik (Quantum Mechanics). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each count 50% towards the overall grade awarded for the module.						
Allocation of places						

Bachelor's with 1	major Physics	(2010)

Additional information
Workload
Teaching cycle
Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
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)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 19 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e title				Abbreviation	
Theore	tical Mecha	anics and Quantum	Mechanics for FOKUS	Students	11-TQM-F-092-m01	
Module	e coordinat	or		Module offered by		
Managi and Ast	ing Director trophysics	r of the Institute of	Theoretical Physics	Faculty of Physics a	ind Astronomy	
ECTS	Method of	f grading	Only after succ. con	npl. of module(s)		
16	numerical	grade	10-M-PHY1 and 10-N 11-KP	A-PHY2 or 10-M-NST1	and 10-M-NST2 and	11-TQM-1,
Duratio	n Mo	dule level	Other prerequisites	i		
2 seme	ster und	dergraduate				
Conten	ts					
Newton Probler Limits c cillator. ny-part	nian mecha ns of centra of classical . Angular m icle system	nics. Lagrangian ar al forces, minor vib physics. Schröding omentum and spin	nd Hamiltonian formali rations, rigid body, mo ger equation, mathema . Hydrogen atom. Meth	sm. Symmetries and tion in electromagne tical principles of qu nods of approximatio	conservation laws. <i>A</i> etic fields. Relativistio antum mechanics, h on. Motion in electric	Applications: c dynamics. narmonic os- fields. Ma-
Intende	ed learning	outcomes				
The stu miliar w of quar of Theo cal con	dents have with the prin ntum theory pretical Physic cepts.	e gained first experi nciples of theoretic y. They are able to a sics and to interpre	ences concerning the v al mechanics and their apply the acquired calc t the results. They hav	working methods of r different formulatio rulation methods and e especially acquired	Theoretical Physics. ns and understand t d techniques to simp d knowledge of basic	They are fa- he principles le problems mathemati-
Course	S (type, numbe	er of weekly contact hours	, language — if other than Ge	rman)		
Theoret year (w Quante + Ü (2 v	tische Mecl inter seme nmechanik veekly cont	hanik (Theoretical M ster) < für FOKUS-Studier tact hours) + T (1 we	Mechanics): V (4 weekl ende (Quantum Mecha eekly contact hour), on	y contact hours) + Ü anics for FOKUS Stud ce a year (block taug	(2 weekly contact ho lents): V (4 weekly co ht during semester b	ours), once a ontact hours) oreak bet-
ween s	ummer and	l winter semester)				
Method	d of assess	ment (type, scope, lang	uage — if other than German,	examination offered — if no	ot every semester, information	on on whether
module is	creditable for	bonus)				
1. Topic amin 2. Topic chan 3. Topic minu	ation (app cs covered cs covered ics for FOK cs covered tes, usuall	ne following assess in lectures and exe rox. 120 minutes). in lectures and exe US Students)): writt in lectures and exe y chosen) or writter	rcises in part 1 (Theore rcises in part 1 (Theore ten examination (appro rcises in parts 1 and 2: n examination (approx.	tische Mechanik (Th enmechanik für FOKI ox. 120 minutes). oral examination of . 120 minutes).	eoretical Mechanics) JS-Studierende (Qua one candidate each)): written ex- antum Me- (approx. 30
Succes ponent To qual Studen Quante these to Studen To pass compoi The gra compoi	sful comple s 1 and 2. lify for adm ts are high mechanik wo courses ts must reg s this modu nent 3. de achieve nent 3 will ion of place	etion of approx. 50° ission to assessme ly recommended to < für FOKUS-Studier s will be covered in a gister for assessmen ile, students must f ed in assessment co each count 50% tow	% of practice work each attend both courses T ende (Quantum Mecha assessment componer nt components 1 throu irst pass assessment of pmponent 1 or 2 (which wards the overall grade	h is a prerequisite fo ents must pass asses heoretische Mechan anics for FOKUS Stud nt 3. gh 3 online (details t component 1 or 2 and hever is better) and th e awarded for the mo	r admission to asses ssment component 1 ik (Theoretical Mech lents). The topics dis to be announced). d must then pass ass he grade achieved in odule.	and/or 2. anics) and cussed in sessment assessment
Allocat	ion of place	5				
	with a major Di-			irg a gonorated of Aug of	• 022m	page 20 / 255
Dachelor S	with a major Phy	ysics (2010)	jiviu wurzbu reg. data reg	ng - generateu 26-Aug-2024 ord Bachelor (180 FCTS) Phys	• exam.	page 20 / 250

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Additional information

Students who intend to study the FOKUS Master's degree programme must take Quantenmechanik für FO-KUS-Studierende (Quantum Mechanics for FOKUS Students) instead of Quantenmechanik (Quantum Mechanics).

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 (2010) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 21 / 250
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Lab Course Physics

(17 ECTS credits)

Modules from the area Physikalisches Praktikum (Physics Practical Course) will not factor into the overall grade of the Bachelor's degree.

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 22 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Practic	Practical Course B (Physics) 11-P-PB-P-092-m01					
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of <i>I</i>	Applied 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	11-P-PA			
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
Physica	al laws	of optics, vibrations an	d waves, science of ele	ectricity and circuits	with electric compor	ients.
Intende	ed leari	ning outcomes		•	•	
The stu le to in measur princip	dents l depenc ring pro les of s	know and have mastere lently plan and conduct ptocol. They are able to tatistics and to draw, p	d physical measuring experiments, to coop evaluate the measurin resent and discuss the	methods and experinerate with others, an g results on the basi conclusions.	menting techniques. d to document the rest s of error propagatic	. They are ab- esults in a on and of the
Course	S (type, n	umber of weekly contact hours	, language — if other than Gei	rman)		
Klassis Elektriz	che Ph itätslei	ysik (Classical Physics, hre und Schaltungen (E	KLP): P (2 weekly cont lectricity and Circuits,	act hours) ELS): P (2 weekly cor	ntact hours)	
Method 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	ion on whether
cess of th 2. Lab o cess of th Studen nent, th To pass	 Lab course in part 1 (KLP): a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes). Lab course in part 2 (ELS): a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes). Students must register for assessment components 1 and 2 online (registration deadline to be announced). Students will be offered one opportunity to retake element a) and/or element b). To pass an assessment component, they must pass both elements a) and b). 					
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teachi	ng cycl	6	,			
	<u> </u>					
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	immes)		
§ 53 (1) § 53 (1) § 77 (1)	1. a) P 1. c) P 1. d) P	hysik Mechanik, Wärme hysik physikalische Gru hysik "physikalische Pr	elehre, Elektrizitätslehi ndpraktika aktika"	re, Optik, der speziel	len Relativitätstheor	'ie
Module	e appea	in and a second s				
Bachel No fina	or' deg l exami	ree (1 major) Physics (2 ination Special study of	010) fering (2010)			
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 23 / 250

Module	title				Abbreviation
Practica	al Cour	se C (Physics)		11-P-PC-P-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	(not) s	successfully completed	11-P-PA and 11-P-PB-	·P	
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate			
Content	ts				
Physica ge oscil	l laws loscop	of wave optics, Atomic an bes.	nd Nuclear Physics, b	asic measuring met	hods using computers and stora-
Intende	d learı	ning outcomes			
The stue le to inc measur principl	dents l lepenc ing pro es of s	know and have mastered lently plan and conduct e ptocol. They are able to ev tatistics and to draw, pre	physical measuring experiments, to coop valuate the measurin esent and discuss the	methods and experinerate with others, an g results on the basi conclusions.	menting techniques. They are ab- d to document the results in a s of error propagation and of the
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Wellend Atom- u Comput	optik (F Ind Ker ter und	Physical Optics, WOP): P mphysik (Atomic and Nuc Messtechnik (Computer	(2 weekly contact hou clear Physics, AKP): P s and Measurement ⁻	urs) (2 weekly contact ho Fechnology, CMT): P	ours) (2 weekly contact hours)
Method	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. Lab c ly cor physi 2. Lab c ly cor physi	 This module has the following assessment components 1. Lab course in part 1: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes). 2. Lab course in part 2: a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. b) Talk (with discussion) to test the students' understanding of the physics-related contents of the course (approx. 30 minutes). 				
Student Student nent, th To pass To pass	Students must register for assessment components 1 and 2 online (registration deadline to be announced). Students will be offered one opportunity to retake element a) and/or element b). To pass an assessment compo- nent, they must pass both elements a) and b). To pass this module, students must successfully complete two out of the three courses.				
Allocati	on of p	olaces			
Additio	nal inf	ormation			
Workloa	ad				
Teachin	ig cycl	e			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
§ 53 (1) § 53 (1) § 77 (1)	1. a) P 1. b) P 1. b) P	hysik Mechanik, Wärmelo hysik Aufbau der Materie hysik "Fortgeschrittene E	ehre, Elektrizitätslehr xperimentalphysik"	e, Optik, der speziel	len Relativitätstheorie

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 24 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module appears in

Bachelor' degree (1 major) Physics (2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 25 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Bachelor's with 1 major Physics (2010)

Module	title				Abbreviation
Practical Course A					11-P-PA-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)	
5	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Physica pagatic tests, w	al laws on, grap vriting o	of mechanics, thermodyn ohs, linear regression, av of lab reports and publica	namics, science of ele erage values and star ations.	ectricity, types of errond ndard deviation, dist	or, error approximation and pro- tribution functions, significance
Intende	ed leari	ning outcomes			
The stu le to in measu princip	dents depenc ring pro les of s	know and have mastered lently plan and conduct e otocol. They are able to ev tatistics and to draw, pre	physical measuring experiments, to coope valuate the measuring esent and discuss the	methods and experin erate with others, an g results on the basi e conclusions.	menting techniques. They are ab- d to document the results in a s of error propagation and of the
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Auswer Ü (1 we Beispie BAM): F	tung vo ekly co ele aus P (2 we	on Messungen und Fehle ntact hour), once a year Mechanik, Wärmelehre u ekly contact hours)	rrechnung (Measurer (winter semester) Ind Elektrik (Example	nents and Data Anal s from Mechanics, T	ysis): V (1 weekly contact hour) + hermodynamics and Electricity,
Method	d 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)			
This mo 1. Topic 2. Lab c ted if lated	odule h cs cove course: f a Test l conter	as the following assessm red in lectures and exerc a) Preparing, performing at (exam) is passed. b) Ta nts of the course (approx	nent components ises: written examina and evaluating the e alk (with discussion) . 30 minutes).	ation (approx. 120 m experiments will be c to test the students'	inutes) onsidered successfully comple- understanding of the physics-re-
Succes 1. To pass portuni Studen Studen re atter Electric To pass	sful con asses ty to re ts mus ts mus iding B ity). s this m	mpletion of approx. 50% sment component 2, stud take element a) and/or e t register for assessment t attend Auswertung von eispiele aus Mechanik, V nodule, students must pa	of practice work is a dents must pass both lement b). components 1 and 2 Messungen und Fehl Värmelehre und Elekt ss both assessment	prerequisite for adm n elements a) and b) online (details to be errechnung (Measur rik (Examples from I component 1 and as	ission to assessment component . Students will be offered one op- e announced). rements and Data Analysis) befo- Mechanics, Thermodynamics and sessment component 2.
Allocation of places					
Additional information					
Worklo	ad				
Teachin	ng cycl	e			

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

§ 53 (1) 1. a) Physik Mechanik, Wärmelehre, Elektrizitätslehre, Optik, der speziellen Relativitätstheorie

§ 53 (1) 1. c) Physik physikalische Grundpraktika

§ 77 (1) 1. d) Physik "physikalische Praktika"

Module appears in

Bachelor' degree (1 major) Mathematics (2014) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2014) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major) Aerospace Computer Science (2014) Bachelor' degree (1 major) Aerospace Computer Science (2011) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010) No final examination Special study offering (2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 27 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	





Mathematics (32 ECTS credits)

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	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e title				Abbreviation
Mathe	matics	1 and 2 for students in P	hysics		10-M-PHY12-092-m01
Module	e coord	inator		Module offered by	
Dean o	of Studi	es Mathematik (Mathema	atics)	Institute of Mathem	natics
ECTS	Meth	od of grading	Only after succ. compl. of module(s)		
16	nume	rical grade			
Duratio	on	Module level	Other prerequisites	;	
2 seme	ester undergraduate By way of exception, additional prerequisites are listed in the assessments.		isites are listed in the section on		

Contents

Fundamentals on numbers and functions, sequences and series, differential and integral calculus in one variable, vector spaces, simple differential equations, linear maps and systems of linear equations, matrix calculus, eigenvalue theory, differential and integral calculus in several variables, differential equations, Fourier analysis.

Intended learning outcomes

The student gets acquainted with fundamental concepts of advanced mathematics. He/She learns to apply these methods to problems in natural sciences, in particular in physics, and is able to interpret the results.

Courses (type, number of weekly contact hours, language - if other than German)

This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 10-M-PHY12-1-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 10-M-PHY12-2-092: V + Ü (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)

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 10-M-PHY12-1-092: Mathematics 1 for Students in Physics Mathematics 1 for Students in Physics

- 8 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 90 to 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Assessment in module component 10-M-PHY12-2-092: Mathematics 2 für Students in Physics Mathematics 2 für Students in Physics

- 8 ECTS, Method of grading: numerical grade
- written examination (approx. 90 to 120 minutes, usually chosen) or oral examination of one candidate each (approx. 20 minutes) or oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English if agreed upon with the examiner
- Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 29 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

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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.

Allocation of places

Additional information

Workload

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's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 30 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation		
Mathematics 3 and 4 for Physicists and Engineers		11-DFS-092-m01			
Module coordinator			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)	
16	nume	rical grade			
Duratio	n	Module level	Other prerequisites	i	
2 seme	ster	undergraduate			
Conten	ts				
Principl lecture ons and function quantu function framew	les of c of the d partia nal ana m mec n creat cork of c	ommon and partial differ module component 11-DF al differential equations. alysis, which is needed in hanical states as vectors ed through basic states a quantum mechanics.	rential equations in P FS-1 covers common of The lecture of the mo the course Quantum . The non-visualised and the Dirac bracket	Physics as well as fur differential equation dule component 11-I n mechanics I. The de form of quantum me formalism make up	action analysis and theory. The s, systems of differential equati- DFS-2 covers basic knowledge of efinition of Hilbert space explains chanics, the depiction as wave an important part of the formal
Intende	ed lear	ning outcomes			
The stu partial o the the	dents l differei ory of f	have basic mathematical ntial equations. In additio unctions of complex vari	knowledge of dynam on, they have basic k ables and are familia	nic equations and so nowledge of the mat r with the correspon	lution methods for common and hematics of Hilbert space and ding calculation methods.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)	
Mathematik 3 (Mathematics 3): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (winter se- mester) Mathematik 4 (Mathematics 4): V (4 weekly contact hours) + Ü (2 weekly contact hours), once a year (summer se- mester)					
Methoo module is	l of ass creditab	eessment (type, scope, langua le for bonus)	ge — 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 in part 1 (Mathematik 3 (Mathematics 3)): written examination (approx. 120 minutes). 2. Topics covered in lectures and exercises in part 2 (Mathematik 4 (Mathematics 4)): written examination (approx. 120 minutes). 3. Topics covered in lectures and exercises in parts 1 and 2: oral examination of one candidate each (approx. 30 minutes, usually chosen) or written examination (approx. 120 minutes). Assessment component 3 will be offered in German; English if agreed upon with examiner(s). Successful completion of approx. 50% of practice work each is a prerequisite for admission to assessment components 1 and 2. To qualify for admission to assessment component 3, students must pass assessment component 1 and/or 2. Students are highly recommended to attend both courses Mathematik 3 (Mathematics 3) and Mathematik 4 (Mathematics 4). The topics discussed in these two courses will be covered in assessment component 3. Students must register for assessment components 1 through 3 online (details to be announced). To pass this module, students must first pass assessment component 1 or 2 and must then pass assessment component 3. The grade achieved in assessment component 1 or 2 (whichever is better) and the grade achieved in assessment component 3 will each court so% towards the overall grade awarded for the module 					
Allocation of places					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.
	reg. data record Bachelor (180 ECTS) Physik - 2010

Additional information

Workload

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's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 32 / 250
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Compulsory Electives

(33 ECTS credits)

Of a total of 33 ECTS credits in the area of mandatory electives, a total of 10 ECTS credits achieved in modules with numerical grading will factor into the overall grade of the Bachelor's degree.

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	
	reg. data record Bachelor (180 ECTS) Physik - 2010	1



Chemistry, Computer Science, Numerical Mathematics

(ECTS credits)

Abbr.: CIN. Modules covering fundamental principles of chemistry, computer science and numerical mathematics.

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 34 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Numerical Mathematics 1			10-M-NM1-082-m01			
Module coordinator			Module offered by	Module offered by		
Dean of Studies Mathematik (Mathema		matics)	Institute of Mathem	natics		
ECTS	Metho	od of grading	Only after succ. com	Only after succ. compl. of module(s)		
8	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 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					
Solutio ons, int	n of sy: terpola	stems of linear equation with polynomials,	ons and curve fitting pro splines and trigonome	blems, nonlinear eq tric functions, nume	uations and system rical integration.	s of equati-
Intende	ed learı	ning outcomes				
The stu to pract	dent is tical pr	acquainted with the for a cquainted with the for a cquainted with the formation of the cquainted with the cquai	undamental concepts a out their typical fields o	nd methods in nume f application.	erical mathematics, a	applies them
Course	S (type, n	umber of weekly contact hour	s, language — if other than Ger	man)		
V + Ü (r	no infor	mation on SWS (week	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, e	examination offered — if no	t every semester, informat	ion on whether
written examination (approx. 90 minutes); if announced by the lecturer, the written examination can be replaced by an oral examination of one candidate each (approx. 20 minutes) or an oral examination in groups (groups of 2, approx. 30 minutes)						
Allocation of places						
Additional information						
Worklo	ad					
Teachi	ng cycl	е				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
§ 73 (1) 5. Mathematik Angewandte Mathematik						
Module appears in						
Bachelor' degree (1 major) Computer Science (2010)						
Bachel	or deg or deg	ree (1 major) Mathema ree (1 maior) Physics (1	tics (2008) 2010)			
Bachel	or' deg	ree (1 major) Physics (2	2009)			
Bachel	or' deg	ree (1 major) Physics (2	2012)			
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 35 / 250

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Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) 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) 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) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 36 / 25				
	reg. data record Bachelor (180 ECTS) Physik - 2010					
Module title				Abbreviation		
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Numerical Mathematics 2				10-M-NM2-082-mo:	1	
Module coord	inator		Module offered by			
Dean of Studi	es Mathematik (Mathe	matics)	tics) Institute of Mathematics			
ECTS Metho	od of grading	Only after succ. com	Only after succ. compl. of module(s)			
5 nume	rical grade					
Duration	Module level	Other prerequisites				
1 semester undergraduate C s a d t t s t e s		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 anow.			
Contents						
Solution meth nary differenti	ods and applications f al equations, boundar	or eigenvalue problems y value problems.	s, linear programmin	g, initial value probl	ems for ordi-	
Intended lear	ning outcomes					
The student is able to draw a distinction between the different concepts of numerical mathematics and knows about their advantages and limitations concerning the possibilities of application in different fields of natural and engineering sciences and economics.						
Courses (type, r	number of weekly contact hour	rs, language — if other than Ger	rman)			
V + Ü (no infor	mation on SWS (week	ly contact hours) and co	ourse language avail	able)		
Method of ass module is creditab	sessment (type, scope, lang le for bonus)	guage — if other than German, e	examination offered — if no	t every semester, informati	ion on whether	
written examin by an oral exa 2, approx. 30 Language of a	nation (approx. 90 min mination of one candio minutes) ssessment: German, E	utes); if announced by date each (approx. 20 n nglish if agreed upon w	the lecturer, the writ ninutes) or an oral ex ith the examiner	ten examination can kamination in groups	be replaced s (groups of	
Allocation of p	olaces					
Additional inf	ormation					
Workload						
Teaching cycl	e					
Referred to in	LPO I (examination regulat	ons for teaching-degree progra	mmes)			
§ 73 (1) 5. Mat	hematik Angewandte I	Mathematik				
Module appea	urs in	tice (c.c.c.0)				
Bachelor' deg Bachelor' deg Bachelor' deg Bachelor' deg	ree (1 major) Mathema ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Physics (2	2010) 2009) 2012)				
Bachelor's with 1 ma	jor Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 37 / 250	

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Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Technology of Functional Materials (2009) Bachelor' degree (1 major) Technology of Functional Materials (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Economathematics (2009) Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Aerospace Computer Science (2009) Bachelor' degree (1 major) Aerospace Computer Science (2011) 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) 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) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 38 / 25
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	Module title Abbreviation						
Progra	mming	course for students of I	Mathematics and othe	er subjects	10-M-PRG-082-m01		
Module	e coord	inator		Module offered by	Module offered by		
Dean o	f Studi	es Mathematik (Mathem	natics)	Institute of Mathem	natics		
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)			
3 (not) successfully completed				, ,,			
Duration Madula laval			Other prerequisites				
1 como	ctor	undergraduate	Admission proroqui	site to according	rogular attendance (attandanca	
1 Seine		undergraduate	monitored, a maxim	um of one incident of	of unexcused absend	ce).	
Conten	ts						
Basics matics.	of a mo	odern programming lang	guage (e. g. C or Fortra	n) taking into accour	nt the particular need	ds in mathe-	
Intende	ed lear	ning outcomes					
The stu in math	ident is nematio	able to work independents.	ently on small progran	nming exercises and	standard programm	ing problems	
Course	S (type, r	number of weekly contact hours,	 language — if other than Gei	rman)			
P (no ir	format	tion on SWS (weekly cor	tact hours) and cours	e language available	2)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether							
module is	module is creditable for bonus)						
project Langua	in the ge of a	form of programming ex ssessment: German, En	ercises (as specified a glish if agreed upon w	at the beginning of th vith the examiner	ie course)		
Allocat	ion of j	olaces					
Additio	onal inf	ormation					
Worklo	ad						
Teachi	ng cycl	ρ	_				
	is cyci		-				
Deferre				`			
Reieffe		LPUT (examination regulatio	ns for teaching-degree progra	immes)			
<u>973(1)</u>	5. Mat	.nematik Angewandte M	athematik				
Module	e appea	ars in					
Bachel	or' deg	ree (1 major) Mathemati	cs (2008)				
Bachel	or deg	ree (1 major) Physics (20	010 <i>)</i>				
Bachel	or deg	ree (1 major) Physics (20	009)				
Bachel	or deg	ree (1 major) Physics (20	(12)				
Bachel	or' dag	ree (1 major) Filysics (20	of Functional Materia	215 (2000)			
Bachelor' degree (1 major) Technology of Functional Materials (2009)							
Bachelor' degree (1 major) Nanostructure Technology (2010)							
Bachel	or' deg	ree (1 major) Fconomath	nematics (2009))			
Bachel	or' deg	ree (1 maior) Economath	nematics (2008)				
Bachel	or' deg	ree (1 major) Mathemati	cal Physics (2009)				
Bachel	or' deg	ree (1 major) Computatio	onal Mathematics (20	09)			
Master	's degr	ee (1 major) Physics (20	10)	~			
Master	's degr	ee (1 major) Technology	of Functional Materia	ls (2010)			
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data rece	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 39 / 250	

Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 40 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e title				Abbreviation	
Compu	terorie	nted Mathematics			10-M-COM-082-mo	1
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mather	natics)	Institute of Mathem	atics	
FCTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
2 (not) successfully completed						
Duratia	<u>[(ii0t) :</u>		Other prorequisites			
Duratio				•	1 11 1	<u> </u>
1 seme	ster	undergraduate	Admission prerequi (attendance monito sence).	site to assessment: red, a maximum of o	regular attendance c ne incident of unexo	of exercises cused ab-
Conten	Its					
Introdu merica 10-M-A lar diffe	iction to l comp I NL) and erential	o modern mathematica utation (e.g. Matlab) to d 10-M-LNA). Computer- and integral calculus;	l software for symbolic supplement the basic based solution of prol visualisation of functic	computation (e.g. modules in analysis plems in linear algeb pns.	Mathematica or Map and linear algebra ra, geometry, analys	le) and nu- ((10-M-ANA or is, in particu-
Intend	ed lear	ning outcomes				
The stu fields c	udent le of appli	earns the use of advanc cation to solve mathem	ed modern mathemati atical problems.	cal software package	es, and is able to as	sess their
Course	S (type, r	number of weekly contact hours	, language — if other than Ge	rman)		
V + Ü (I	no infoi	mation on SWS (weekly	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
project Assess Langua	in the ment o age of a	form of programming ex ffered: once a year, sur ssessment: German, Er	kercises (as specified a nmer semester nglish if agreed upon w	at the beginning of th vith the examiner	ie course)	
Allocat	ion of j	olaces				
Additio	onal inf	ormation				
Worklo	bad					
WORKIO	au					
Teachi	ng cyci	e				
Referre	ed to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)		
§ 73 (1)) 5. Mat	hematik Angewandte N	lathematik			
Module	e appea	urs in				
Bachel	or' deg	ree (1 major) Computer	Science (2010)			
Bachel	or' deg	ree (1 major) Mathemat	ics (2008)			
Bachel	or' deg	ree (1 major) Physics (2	010)			
Bachel	or' deg	ree (1 major) Physics (2	009)			
Bachel	or deg	ree (1 major) Physics (2	012 <i>)</i>			
Bachel	or' deg	ree (1 major) Physics (2	uuoj v of Functional Matoria	als (2000)		
Bachel	or' deg	ree (1 major) Technolog	y of Functional Materia	als (2009) als (2010)		
Bachel	or' deg	ree (1 major) Nanostruc	ture Technology (2010)		
Bachel	or' deg	ree (1 major) Economat	hematics (2009)	,		
						·
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data rec	urg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 41 / 250

Bachelor' degree (1 major) Economathematics (2008) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Computational Mathematics (2009) Master's degree (1 major) Physics (2010) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Mathematics (Minor, 2008) First state examination for the teaching degree Gymnasium Mathematics (2009)

Bachelor's with 1 major Physics (2010)	JMU Würzburg ● generated 26-Aug-2024 ● exam.	page 42 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	i i

Module	title				Abbreviation
Introduction to Computer Science for Students of all Faculties				10-I-EIN-072-m01	
Module coordinator				Module offered by	
Dean of	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science
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	undergraduate	Admission prerequis in exercises as spec	site to assessment: a ified at the beginnin	academic requirements to be met g of the course.
Conten	ts				
Founda bases,	tions o algoritl	f computer science inclu hms and data structures,	ding representation of programming (Java).	of information and w	ebsites (HTML, XML, EBNF), data-
Intende	ed leari	ning outcomes			
The stu mation	dents a and we	are familiar with the fund ebsites (HTML, XML, EBN	amentals of compute F), databases, algorit	r science, e.g. in the hms and data struct	e areas of representation of infor- ures, programming in Java.
Course	S (type, n	umber of weekly contact hours, la	anguage — if other than Ger	man)	
V + Ü +	Ü (no i	nformation on SWS (wee	kly contact hours) an	d course language a	vailable)
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) writt or c) or	en exaı al exan	mination (approx. 90 min nination in groups (group	utes) or b) oral exam s of 2: 30 minutes, gr	ination of one candi oups of 3: 40 minut	date each (approx. 20 minutes) es)
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	appea	ars in			
Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo Bachelo	or' deg or' deg or' deg or' deg or' deg or' deg or' deg or' deg or' deg 's degr or's deg	ree (1 major) Geography (ree (1 major) Geography (ree (1 major) Geography (ree (1 major) Physics (200 ree (1 major) Nanostructu ee (1 major) Physics (2010 gree (1 major, 1 minor) Di	(2007) (2008) (2010) 07) 10) 12) 08) 1re Technology (2010) 0) gital Humanities (Min	nor, 2009)	
Bachel	or's deg	gree (2 majors) Digital Hu	imanities (2009)	· · · · //	

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 43 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e title				Abbreviation		
General Chemistry for Physics and Engineers			08-CP1-102-m01				
Module coordinator				Module offered by			
lecture	lecturer of the course			Institute of Inorgan	ic Chemistry		
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	undergraduate	undergraduate				
Conten	Contents						
This mo studen	odule d ts the c	iscusses the fundame opportunity to learn ess	ntal principles of both i sential methods and pe	norganic and organi rform simple experir	c chemistry. The lab ments.	course gives	
Intende	ed lear	ning outcomes					
Studen to expla cal form le to ide	ts are a ain bas nulas te entify f	able to explain the prin ic models of the struct o describe chemical rea undamental problems	ciples of the periodic ta ure of matter. They hav actions and to interpret in chemistry and perfor	able and to extract in e developed the abil them by identifying m experiments to so	formation from it. Th ity to use the langua the type of reaction live them.	ney are able age of chemi- . They are ab-	
Course	S (type, r	umber of weekly contact hour	s, language — if other than Gei	rman)			
This mo comport o o o	 This module comprises 3 module components. Information on courses will be listed separately for each module component. 08-IOC-1-072: V (no information on SWS (weekly contact hours) and course language available) 08-CP1-3-072: P (no information on SWS (weekly contact hours) and course language available) 08-CP1-1-102: V (no information on SWS (weekly contact hours) and course language available) 						
Method module is	creditab	s essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	ion on whether	
Assess low. Un vidual a	ment ir Iless st assess	n this module comprise ated otherwise, succes ments.	es the assessments in t soful completion of the	he individual modul module will require :	e components as sp successful completio	ecified be- on of all indi-	
Assess tal med 3 4 4 5 4 5 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5	ment in licine, o ECTS, vritten o ment in ECTS, or each ical per ssessn Only aft 8-CP1- ment in ECTS, vritten o	n module component o engineering and natura Method of grading: nur examination (approx. 6 n module component o Method of grading: (no experiment: Vortestat formance (log, 2 to 5 p nent offered: once a ye er successful completi- t is a prerequisite for p n module component o Method of grading: nur examination (approx. 9	8-IOC-1-072: Organic C Il science merical grade o minutes) 8-CP1-3-072: General a ot) successfully comple e (pre-experiment exan ages), Nachtestate (po ar, summer semester on of module compone articipation in module 8-CP1-1-102: Principles merical grade o minutes)	hemistry for student and Analytical Chemi ted ns, approx. 10 minut st-experiment exams ents: Successful com component 08-CP1-3 of Inorganic Chemis	s of medicine, biom stry (lab) es each), assessme 5, approx. 10 minute pletion of module c 3. stry for Physics and B	edicine, den- nt of prac- s each) omponent Engineering	
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Bachelor's	with 1 ma	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 44 / 250	

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 45 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Current	Current Topics in Experimental Physics			11-BXE5-112-m01		
Module coordinator Module of			Module offered by			
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate	Approval by examination	ation committee req	uired.	
Content	ts					
Current or study	topics / abroa	of Experimental Physics. Id.	Accredited academi	c achievements, e.g.	in case of change of university	
Intende	d learr	ning outcomes				
The stur sics of t underst classify	dents l he Bac and th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	icies corresponding t v have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and knowledge. They are able to	
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 in group weeks) Langua	en exar os (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4	
Allocati	ion of p	olaces				
Additio	nal info	ormation				
Workloa	ad					
Teachin	ig cycl	9				
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)		
Module	appea	irs in				
Bachelo	or' deg	ree (1 major) Physics (20:	lo)			
Bachelo	or' deg	ree (1 major) Physics (20:	12)			

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 46 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation				Abbreviation		
Current Topics in Experimental Physics 11-BXE6-112-m01			11-BXE6-112-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	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current study a	topics broad.	in Experimental Physics.	Credited academic a	achievements, e.g. in	case of change of university or	
Intende	ed learr	ning outcomes				
The stu sics of t underst classify	dents ł the Bac tand th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	icies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and s knowledge. They are able to	
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	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)					t every semester, information on whether	
a) writte in group weeks) Langua	en exar ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pres ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4	
Allocation of places						
Additio	nal inf	ormation				
Worklo	ad					
Teachir	Teaching cycle					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	appea	ars in				
Bachelo	or' deg	ree (1 major) Physics (201	10)			
Bachelo	or' deg	ree (1 major) Physics (201	12)			

Module	title				Abbreviation	
Current Topics in Experimental Physics 11-BXE8-112-mo				11-BXE8-112-m01		
Module	coord	inator		Module offered by	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)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate	Approval by examination	ation committee req	uired.	
Conten	ts					
Current study a	topics broad.	in Experimental Physics.	Credited academic a	achievements, e.g. in	case of change of university or	
Intende	ed learr	ning outcomes				
The stu sics of t underst classify	dents ł the Bac tand th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	icies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and knowledge. They are able to	
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	ourse language availa	able)	
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	
a) writte in group weeks) Langua	en exar os (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4	
Allocation of places						
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	appea	irs in				
Bachelo	or' deg	ree (1 major) Physics (201	ιο)			
Bachelo	or' degi	ree (1 major) Physics (201	12)			

very data record Deckelar (r.C. F.C.T.S.) Physics across	achelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam. page 48	/ 250
reg. data record Bachelor (180 ECTS) Physik - 2010		reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	title				Abbreviation
Current Topics in Theoretical Physics 11-BXT5-112-mo1			11-BXT5-112-m01		
Module coordinator				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)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current study a	topics broad.	in Theoretical Physics. C	redited academic ach	nievements, e.g. in c	ase of change of university or
Intende	ed leari	ning outcomes			
The stu sics of t Physics blems o	dents l the Bac and h of Theo	have advanced competer chelor's programme. They ave mastered the require retical Physics.	icies corresponding t v have advanced spea d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-
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	urse language availa	able)
Methoo 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 grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
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	appea	ars in			
Bachelo	or' deg	ree (1 major) Physics (202	10)		
Bachelo	or' deg	ree (1 major) Physics (20:	12)		

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 49 / 250
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Module	title				Abbreviation	
Current	Topics	s in Theoretical Physics			11-BXT6-112-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	undergraduate				
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 Physics blems c	dents l the Bac and h of Theo	nave advanced competer chelor's programme. They ave mastered the require retical Physics.	ncies corresponding t / have advanced spec d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-	
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)	
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	
a) writte in group weeks) Langua	en exar ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pres ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 9 minutes)	idate each or oral examination o pages, time to complete: 1 to 4	
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				
Bachelo	or' deg	ree (1 major) Physics (201	10)			
Bachelo	or' deg	ree (1 major) Physics (201	12)			

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 50 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	title				Abbreviation	
Current Topics in Theoretical Physics 11-BXT8-112-mo1			11-BXT8-112-m01			
Module coordinator				Module offered by	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	undergraduate	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 Physics blems o	dents l the Bac and h of Theo	nave advanced competer chelor's programme. They ave mastered the require retical Physics.	icies corresponding t v have advanced spea d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-	
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	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	
a) writte in grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4	
Allocat	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				
Bachelo	or' deg	ree (1 major) Physics (20:	10)			
Bachelo	or' deg	ree (1 major) Physics (20:	12)			

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Applied Physics and Metrology

(ECTS credits)

Modules offered by the Faculty in the area of Angewandte Physik und Messtechnik (Applied Physics and Measurement Technology).

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 52 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title					Abbreviation	
Labora	Laboratory and Measurement Technology				11-A3-072-m01	
Module	e coord	inator		Module offered by	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 i		
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 lat 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 for admission to assessment anew.			
Conten	ts					
Introdu nics, cr	iction to yogeni	o electronic and optica cs, light sources, spec	l measuring methods o troscopic methods and	f physical metrology measured value acq	, vacuum technology uisition.	/ and cryoge-
Intende	ed lear	ning outcomes		-		
The stu cal met red vali	idents trology, ue acqi	have acquired the follo , cryogenics and vacuu uisition.	wing transferable skills m technology, cryogeni	: Electronic and opti cs, light sources, sp	cal measuring methe ectroscopic methods	ods in physi- s and measu-
Course	S (type, r	number of weekly contact hour	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, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether
written	exami	nation (approx. 120 mi	nutes)			
Allocat	ion of _l	olaces				
Only as	s part o	f pool of general key sl	kills (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Additio	onal inf	ormation				
Worklo	ad					
	7					
Teachi	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	ars in				
Bachel Bachel Bachel Bachel Bachel Bachel	Bachelor' degree (1 major) Physics (2007) 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) Nanostructure Technology (2010)					
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu	rg • generated 26-Aug-2024	• exam. ik - 2010	page 53 / 250
			reg. data rec	ora dachelor (180 ECTS) Phys	IN - 2010	

Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 54 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation			
Opto-electronic Material Properties 11-MOE-092				11-MOE-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	n	Module level	Other prerequisites				
Duration Module level 1 semester graduate		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 lat	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				
			for admission to as	sessment anew.		qualification	
Conten	ts						
Physica	al princ	iples of optoelectronic	material properties an	d applications.			
Intende	ed lear	ning outcomes		•••			
The stu	dents	know the principles of	optoelectronic material	characteristics.			
Course	S (type, r	number of weekly contact hour	rs, language — if other than Ge	rman)			
V + Ü (r	no info	mation on SWS (week	ly contact hours) and co	nurse language avail	ahle)		
Method module is	d of ass s creditab	essment (type, scope, lang	guage — if other than German,	examination offered — if no	t every semester, informati	on on whether	
a) writt groups project prox. 3	en exa (appro report o minu	mination (approx. 90 n x. 30 minutes per cano (approx. 10 pages, tim tes)	ninutes) or b) oral exam didate, for modules with e to complete: 1 to 4 we	iination of one candi n less than 4 ECTS cr eeks) or d) presentat	date each or oral exa edits approx. 20 mir ion/seminar present	amination in 1utes) or c) tation (ap-	
Allocat	ion of _l	olaces					
Additio	nal inf	ormation					
Worklo	ad						
		-					
Teachi	ng cycl	e					
		•					
Poforrad to in LPO L (maninution completions for teaching degree any group of							
Module appears in							
Bachelor' degree (1 major) Physics (2010)							
Master's degree (1 major) Physics (2010)							
Master's degree (1 major) Technology of Functional Materials (2010)							
Master	Master's degree (1 major) Technology of Functional Materials (2009)						
Master	Master's degree (1 major) Nanostructure Technology (2010)						
Master	Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)						
Bachelor's with 1 major Physics (2010) JMU Würzburg • generated 26-Aug-2024 • exam. page 55 / reg. data record Bachelor (180 ECTS) Physik - 2010				page 55 / 250			



Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) Functional Materials (2012)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 56 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation			
Organi	c Semi	conductor			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	Methe	od of grading	Only after succ. con	Only after succ. compl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites	;			
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	iples of organic semico	onductors, molecular a	nd polymer electroni	cs and sensor techn	ology, appli-	
Intende	ed lear	ning outcomes					
The stu	dents	have advanced knowle	dge of organic semicor	iductors.			
Course	S (type, r	number of weekly contact hou	rs, language — if other than Ge	rman)			
V + Ü (r	no info	rmation on SWS (week	ly 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, informat	ion on whether	
a) writt groups project prox. 3	en exa (appro report o minu	mination (approx. 90 n ox. 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	places					
Additio	nal inf	ormation					
Worklo	ad						
Teaching cycle							
Reference to the LFOT (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)							
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu	irg • generated 26-Aug-2024 ord Bachelor (180 FCTS) Phys	• exam. ik - 2010	page 57 / 250	
			765. data 160				

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 58 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	1

Module title					Abbreviation	
Reprod	lucing	Sensors in Infrared			11-ASI-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)		
3	nume	rical grade				
Duratio	on	Module level	Other prerequisites	;		
1 semester undergraduate		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 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	Its					
Infrared range of up to n from bo sical of types of of neur Intende The stu techno	d came of infrar nicrowa odies w ptics of of senso rophysi ed learn udents l logies a	ras are important expe ed ranges from the vis wes and radiowaves w ith ambient temperatu this spectral range an ors (bolometer, quantu ological aspects. ning outcomes have specific and adva and detector structures	erimental and technical ible spectrum, where th ith artificial emitters. Th ure in the infrared spect d discusses: Peculiariti im well, superlattice) as noced knowledge in the s as well as their applic	tools, e.g. for measu ne Sun is dominating nere is distinct and s rum. The lecture pro- es of infrared camera well as the evaluati field of infrared spe- ation areas.	aring temperatures. T as the natural source ometimes dominatir vides an introduction as and thermal imag on of such sensors of ctral imaging. They k	The spectral ce of light, ng emission n to the phy- es, different on the basis
Course	S (type, r	umber of weekly contact hou	rs, language — if other than Ge	rman)		
V + R (r	no infor	mation on SWS (week	ly contact hours) and co	ourse language avail	able)	
Metho module is	d of ass s creditab	essment (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 (appro Assess and wi examir 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						
Workload Teaching cycle						
Bachelor's	with 1 ma	ior Physics (2010)	JMU Würzbı reg. data rec	ırg ● generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 59 / 250

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) Nanostructure Technology (2010)

Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)

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

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 60 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation			
Applied Superconduction					11-ASL-092-m01		
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of	Applied Physics	pplied 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	on	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 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 apow.				
Conten	Its						
Physica thods of	al princ of mate	iples of superconducti rials sciences for the c	vity. Application in ene alculation of temperatu	rgy engineering. Inst Ire profiles in superc	rumental developme onductors.	ents. Me-	
Intend	ed lear	ning outcomes					
The students have a basic understanding of superconductivity as a macroscopic quantum phenomenon. They are able to evaluate the contributions of materials sciences to the development of superconductivity. They are able to discuss questions on superconductivity in a scientific manner and to critically question developments of energy technology. Furthermore, they can deal with practical mathematical questions. 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. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (ap-				non. They . They are . They			
Assess	ment o	ffered: once a year, wi	nter semester				
Allocat	ion of I	blaces					
Additio	onal inf	ormation					
			<u> </u>				
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)				
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data rec	irg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 61 / 250	

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 (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 62 / 25
	reg. data record Bachelor (180 ECTS) Physik - 2010	ĺ

Module title				Abbreviation	
Princip	Principles of Image Processing				11-EBV-092-m01
Module	e coord	inator		Module offered by	
Managi	ing Dire	ector of the Institute of Ap	oplied Physics	ed Physics Faculty of Physics and Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
3	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 semester undergraduate		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				
Introdu transfo tic imag tracking Intende The stu and the le to inc al softw	iction to rm. His ge reco g). Thre ed learn idents l eory of depence vare an	b image processing. Pictu togram equalisation (e.g gnition: Segmentation, c ee-dimensional images. hing outcomes have specific and advance signal processing for imate lently work with literature d are able to process imates	ed knowledge in the ges and have corresp e, they understand the ges for the analysis of	nal signals; digitalis and pixel connectivit ogical image genera field of image proce oonding knowledge o e characteristics of i	ation. Two-dimensional Fourier ty (e.g. noise reduction). Automa- ition. Applications (e.g. motion ssing. They know the principles of image generation. They are ab- mage processing with commerci- imaging measuring methods.
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 avail	able)
Methoo module is	d of ass	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					
Workload					
Teaching cycle					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 63 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

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) Nanostructure Technology (2010)

Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)

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

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 64 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Bachelor's with 1 major Physics (2010)

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	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. com	Only after succ. compl. 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. Ene . Nucle . ity. Bio	resources of energy. We a , selective layers, highly a rgy conservation via ther ar power plants. Hydroeld mass. Geothermal energ ning outcomes	also discuss aspects activated carbons). The mal insulation. Therm ectricity. Wind turbing y. Energy storage. Eng	of optimising materi he course is especia hodynamic energy ef es. Photovoltaics. So ergy transport	ials (e.g. nanostructured insula- lly suitable for teaching degree ficiency. Fossil fired energy con- olar thermal: Heat. Solar thermal:	
The stu	dents l d stora	know the principles of dif ge. They understand the	ferent methods of en structures of corresp	ergy technology, esp onding installations	pecially energy conversion, trans- and are able to compare them.	
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)	<u></u>	
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language avail	able)	
Metho module is	d of ass s creditab	essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot 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.					
Additional information						
Worklo	Workload					
Teachi	Teaching cycle					
L						

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Physik - 2010

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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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 66 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Introduction to Plasmaphysics			11-EPP-092-m01			
Module coordinator			Module offered by			
Managing Director of the Institute of Theo 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 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) as- tive details ll be con- nt. If stu- ssment over tion for as- till be admit- ster. For as- alification for
Conten	ts					
Plasma Transpo thin the celerati	Astrop ort equ solar on and	hysics: Dynamics of cl ations for energetic pa wind, Particle accelera I transport in galaxies a	narged particles in elec rticles, Properties of ma tion via shock waves ar and other astrophysical	tric and magnetic fie agnetic turbulence, F nd via interaction wit l objects, Cosmic rad	lds, Magnetohydrod Propagation of solar h plasma turbulence liation.	ynamics, particles wi- e, Particle ac-
Intende	ed learı	ning outcomes				
The stu ma. The	dents l ey are a	know the principles of able to solve basic prol	Plasma Physics, especi blems of Plasma Physic	ally the description of s and to apply this k	of transport phenom nowledge to Astroph	ena in plas- 1ysics.
Courses	5 (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)	
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	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						
Allocati	ion of p	olaces				
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 67 / 250

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 68 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Semiconductor Lasers - Principles and Current Research				11-HLF-092-m01		
Module coordinator				Module offered by		
Managing Director of the Institute of Applied 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 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 v sidered a declaration of will to seek admission to assessm 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 c		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					
rent developments regarding components. The principles of lasers are described on the basis of a general laser model, which will then be extended to special aspects of semiconductor lasers. Basic concepts such as thres- hold condition, characteristic curve and laser efficiency are derived from coupled rate equations for charge car- riers and photons. Other topics of the lecture are optical processes in semiconductors, layer and ridge wavegui- des, laser resonators, mode selection, dynamic properties as well as technology for the generation of semicon- ductor lasers. The lecture closes with current topics of laser research such as quantum dot lasers, quantum cas- cade lasers, terabertz lasers or high-performance lasers.						
Intende	ed learı	ning outcomes				
The stu knowle	dents l dge to	have advanced knowledg modern questions and k	ge of the principles of now the applications	semiconductor-lase in the current devel	er physics. They can apply their opment of components.	
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (n	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 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	Workload					

Teaching cycle

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

Referred to in LFOT (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 70 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Principles of Classification of Patterns			11-KVM-092-m01			
Module coordinator			Module offered by			
Managing Director of the Institute of Applied Ph		Applied Physics	Faculty of Physics a	nd Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
3	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semester undergraduate		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					
Signals terns. T More a discuss	such a hese p nd mor princi	as images, but also acc atterns are often class e automatic procedure ples of different classi	oustic records, spectra, ified and analysed by o is are adopted to take o fiers such as "minimum	electrical measurem observers, e.g. by a d on these tasks and cl distance" and "max	ents often contain r octor when analysin assify patterns. The imum likelihood".	ecurring pat- g an ECG. lecture will
Intende	ed learı	ning outcomes				
The stu classify these n	dents l ving pat nethod	have specific and adva tterns in measuring da s to practical problems	nced knowledge in the ta as well as ways to au 5.	field of pattern recognition field of pattern recognition field of pattern recognition field of the field of	gnition. They know n esses. They are able	nethods of to apply
V + R (n	o infor	mation on SWS (week)	v contact hours) and co	ourse language avail	able)	
Method	lofass		guage — if other than German	examination offered — if no	t every semester informati	ion on whether
module is	creditab	le for bonus)			cevery semester, mornal	
a) written examination (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		Jaces				
Workload						
Teaching cycle						
-						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's	with 1 maj	jor Physics (2010)	JMU Würzbu reg. data rec	ırg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 71 / 250

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

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 72 / 250		
	reg. data record Bachelor (180 ECTS) Physik - 2010			
Madulatitla				Abbroviation
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Introduction to	Ladview			11-LVW-092-m01
Module coordinator			Module offered by	
Managing Direc	tor of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy
ECTS Method	l of grading	Only after succ. con	npl. of module(s)	
6 numerio	cal 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		
Contents				
each LabVIEW I on fields of the ming and with c on fields, from a and measureme hensive standa upon LabVIEW I to enable the st fields. Course to through an opti computing and VIEW functions ment.	earning phase. LabVIEW development environm common LabVIEW archit assessment and measu ent analysis. In the adva lone applications, inclu Basic 1 and provides an tudents to successfully opics include technique mised reuse of existing methods of error handl according to individual	V Basic provides a sy ent of LabVIEW. The tectures. They learn to rement applications anced course "NI Lab ding the graphical de introduction to the n implement and distri codes, usage of file ing. After finishing th requirements, which	stematic introductions tudents become action of develop LabVIEW are up to data collection VIEW Core 2", the streated of the optimisation of the optimisation of I/O functions, principle course, the studer of a fast and the optime of the studer of the stud	n to the functions and applicati- quainted with dataflow program- applications for various applicati- n, device control, data recording udents learn to develop compre- ment LabVIEW. The course builds opment technologies, in order cations for different application application performance, e.g. ples of data management, event nts have the ability to apply Lab- productive application develop-
Intended learni	ng outcomes			
The students ha les of working w ta.	ave specific and advanc vith LabVIEW and are ab	ed knowledge in the ble to develop applica	application field of l ations, e.g. for record	LabVIEW. They know the princip- ding and analysing measuring da-
Courses (type, nur	mber of weekly contact hours, l	anguage — if other than Ger	rman)	
V + Ü (no inform	nation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method of asse module is creditable	e ssment (type, scope, langua for bonus)	ge — if other than German, o	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) or e) project (approx. 60 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 pla	aces			

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 73 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Additional information

Workload

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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) Nanostructure Technology (2010)

Master's degree (1 major) Physics (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 74 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation			Abbreviation			
Thermo	Thermodynamics and Economics 11-TDO-092-m01					
Module coordinator				Module offered by		
Managi and Ast	Managing Director of the Institute of T 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 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	tc			Sment unew.		
sion in thermo ecologi fine the capital, nomic g system tors lea discuss compris gramme	Energy and economic growth, entropy production, emission reduction. Part I describes the role of energy conver- sion 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 de- fine 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 eco- nomic 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 fac- tors 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 pro- gramme deeco (Dynamic Energy, Emission and Cost Optimization)				n-equilibrium ynamics for esources de- v the factors rmine eco- n the current duction fac- The course esentations, misation pro-	
Intended learning outcomes						
The stu in the w connec mies. T NOTE: t his owr	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. NOTE: this is the module that was run by Prof. Dr. R. Kümmel, who has now retired. As the module was tailored to his own theory of economy, it has yet to be decided whether we will continue to offer this module.					
Course	S (type, n	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)	
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, 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						
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data rec	ırg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 75 / 250

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 76 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	Module title Abbreviation				
Basics in Light- and Electron-Microscopy 07-4S1MZ1-102-mo				07-4S1MZ1-102-m01	
Madula saardinatar				Module offered by	
hoad of	f the D	nation	rocconv	Faculty of Piology	
				Faculty of Biology	
ECIS	Metho	od of grading	Only after succ. com	ipl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Admission prerequis and successful com beginning of the cou	site to assessment: pletion of the respec Irse.	regular attendance of exercises ctive exercises as specified at the
Conten	ts				
Fundan	nental	principles of confocal las	er scanning microsco	py and electron mic	roscopy.
Intende	ed leari	ning outcomes			
Studen	ts have	e acquired theoretical kno	owledge and practica	l skills in the area of	f light and electron microscopy.
Course	S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (r	no 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	ot every semester, information on whether
written	exami	nation (approx. 30 to 60 I	minutes)		
Allocat	ion of p	olaces			
Numbe allocate logy) w ces will 5% of p ject Bio themat ject Bio ble in o the oth places, courses dure, a tive mo they be plicants of ECTS all mod	r of pla ed as fo ith 180 l be allo blaces (blogie (l ics and blogy (a one quot there v s of a m pplicar dule w scome a scorevis credit: lule con	tees: 18. Should the num pollows: Places will primar ECTS credits. Should the pocated to students of the (a minimum of one partic Biology) with 60 ECTS cred Mathematik (Mathemat is well as potentially to st ota exceed the number of ta. Should there be, within will be a uniform regulation odule component that a fits who already have suc- ill be given preferential c available. Selection proce ous academic achievements is they have achieved and mponents in the subject	ber of applications ex- ily be allocated to stu- e module be used in of Bachelor's degree su- ipant in total) will be edits and to students ics), each with 180 E0 tudents of other 'impo- applications, the ren in one module compo- on for the courses of re concerned will be cessfully completed a onsideration. A waiting ents. For this purpose I their average grade of Biologie (Biology) (acceed the number of udents of the Bachel other subjects, there ubject Biologie (Biolo allocated to student of the Bachelor's de CTS credits, as part of orting' subjects). Sho naining places will b onent, several course one module compor allocated in a standa at least one other mod ng list will be mainta acces will primarily be of all assessments t (excluding Chemie (G	available places, places will be lor's degree subject Biologie (Bio- will be two quotas: 95% of pla- ogy) with 180 ECTS credits and ts of the Bachelor's degree sub- gree subjects Computational Ma- of the application-oriented sub- ould the number of places availa- ne allocated to applicants from es with a restricted number of nent. In this case, places on all ardised procedure. In this proce- odule component of the respec- ained and places re-allocated as e allocated according to the ap- ranked according to the number caken during their studies or of Chemistry), Physik (Physics), Ma-

thematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

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	reg. data record Bachelor (180 ECTS) Physik - 2010	

Additional information
Workload
Teaching cycle
Referred to in LPO I (examination regulations for teaching-degree programmes)
Module appears in
Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Biology (2010)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Physics (2010)
Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 78 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e title				Abbreviation
Methods in Biotechnology		07-4S1MZ4-102-m01			
Module coordinator		Module offered by			
holder	of the (Chair of Biotechnology an	id Biophysics	Faculty of Biology	
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	undergraduate			
Conten	ts				
This mo techno lysis of scence	odule (l logy an biolog spectr	ecture and seminar) will d biomedicine and the u ical matter on the molecu oscopy, electron microsc	provide students with nderlying physical pr Jlar and cellular level opy, atomic force mic	h an overview of inst inciples. It will discu . These methods inc croscopy, flow cytom	rument-based methods in bio- ss modern methods for the ana- lude light microscopy, fluore- etry and microfluidics.
Intende	ed leari	ning outcomes			
Studen tages.	ts will g They wi	gain an overview of key m Il learn to decide what m	nethods in biotechno ethod is most suitabl	logy and their respe le for addressing a p	ctive advantages and disadvan- articular issue.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
This mo compo • o • o	odule c nent. 7-4S1N 7-4S1N	omprises 2 module comp 1Z4-1-102: V (no informat 1Z4-2-102: S (no informat	oonents. Information ion on SWS (weekly c ion on SWS (weekly c	on courses will be lis contact hours) and co contact hours) and c	sted separately for each module ourse language available) ourse language available)
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
Assess low. Ur vidual a	ment ir Iless st assessi	n this module comprises ated otherwise, successf ments.	the assessments in t ful completion of the	he individual module module will require s	e components as specified be- successful completion of all indi-
Assess	 Assessment in module component o7-4S1MZ4-1-102: Methods in Biotechnology (lecture) 3 ECTS, Method of grading: numerical grade written examination (approx. 30 minutes) Assessment in module component o7-4S1MZ4-2-102: Methods in Biotechnology - Seminar 2 ECTS, Method of grading: (not) successfully completed 				
Allocat	ion of p	olaces			
Numbe allocate logy) w ces will 5% of p ject Bic themat ject Bic ble in o the oth places, courses dure, a tive mo they be plicant	r of pla ed as fo ith 180 l be allo places (plogie (plogie (come quo there v s of a m pplicar dule w come a s' previ	ces: 25. Should the num ollows: Places will primar ECTS credits. Should the potated to students of the a minimum of one partic Biology) with 60 ECTS cre Mathematik (Mathemati s well as potentially to st ta exceed the number of a. Should there be, withi will be a uniform regulation odule component that a sts who already have succ ill be given preferential c available. Selection proce ous academic achieveme	ber of applications ex- ily be allocated to stu- module be used in of Bachelor's degree su- ipant in total) will be edits and to students ics), each with 180 EC udents of other 'impo- applications, the ren n one module compo- on for the courses of re concerned will be a cessfully completed a onsideration. A waiting ess group 1 (95%): Pla- ents. For this purpose	Acceed the number of udents of the Bachel other subjects, there ubject Biologie (Biolo allocated to student of the Bachelor's de CTS credits, as part o porting' subjects). Sho naining places will b onent, several course one module compon allocated in a standa at least one other mo ng list will be mainta acces will primarily be applicants will be	available places, places will be or's degree subject Biologie (Bio- will be two quotas: 95% of pla- ogy) with 180 ECTS credits and s of the Bachelor's degree sub- gree subjects Computational Ma- if the application-oriented sub- ould the number of places availa- e allocated to applicants from es with a restricted number of nent. In this case, places on all ardised procedure. In this proce- odule component of the respec- ined and places re-allocated as e allocated according to the ap- ranked according to the number

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 79 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

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of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to their total number of ECTS credits allocated according to the qualitative ranking. Among applicants with the same ranking, places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): number of subject semesters of the respective applicant; among applicants by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

Additional information

Workload

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Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Physics (2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 80 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e title				Abbreviation
Specia	l Bioinf	formatics 1			07-4S1MZ6-102-m01
Module	e coord	inator		Module offered by	
holder of the Chair of Bioinformatics				Faculty of Biology	
ECTS Method of grading Or		Only after succ. compl. of module(s)			
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	i	
1 seme	ster	undergraduate	Admission prerequisite to assessment: regular attendance of exercise and successful completion of the respective exercises as specified at beginning of the course.		regular attendance of exercises ctive exercises as specified at the
Conten	ts	°	*		

Fundamental principles of the tree of life, fundamental principles of phylogenetics (methods and markers), fundamental principles of evolutionary biology (concepts), sequence analysis, RNA structure prediction, phylogenetic reconstruction.

Intended learning outcomes

Students are able to use software and databases for sequence analysis, RNA structure prediction and phylogenetic reconstruction.

Courses (type, number of weekly contact hours, language - if other than German)

V + Ü (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)

log (approx. 10 to 20 pages)

Language of assessment: German or English

Allocation of places

Number of places: 20. Should the number of applications exceed the number of available places, places will be allocated as follows: Places will primarily be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits. Should the module be used in other subjects, there will be two quotas: 95% of places will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits and 5% of places (a minimum of one participant in total) will be allocated to students of the Bachelor's degree subject Biologie (Biology) with 60 ECTS credits and to students of the Bachelor's degree subjects Computational Mathematics and Mathematik (Mathematics), each with 180 ECTS credits, as part of the application-oriented subject Biology (as well as potentially to students of other 'importing' subjects). Should the number of places available in one quota exceed the number of applications, the remaining places will be allocated to applicants from the other quota. Should there be, within one module component, several courses with a restricted number of places, there will be a uniform regulation for the courses of one module component. In this case, places on all courses of a module component that are concerned will be allocated in a standardised procedure. In this procedure, applicants who already have successfully completed at least one other module component of the respective module will be given preferential consideration. A waiting list will be maintained and places re-allocated as they become available. Selection process group 1 (95%): Places will primarily be allocated according to the applicants' previous academic achievements. For this purpose, applicants will be ranked according to the number of ECTS credits they have achieved and their average grade of all assessments taken during their studies or of all module components in the subject of Biologie (Biology) (excluding Chemie (Chemistry), Physik (Physics), Mathematik (Mathematics)) at the time of application. This will be done as follows: First, applicants will be ranked, firstly, according to their average grade weighted according to the number of ECTS credits (qualitative ranking) and, secondly, according to their total number of ECTS credits achieved (quantitative ranking). The applicants' position in a third ranking will be calculated as the sum of these two rankings, and places will be allocated according to this third ranking. Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot. Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50% of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, pla-

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	reg. data record Bachelor (180 ECTS) Physik - 2010	

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ces will be allocated by lot. Quota 2 (25% of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. Quota 3 (25% of places): allocation by lot. Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

Additional information

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Workload

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Teaching cycle

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

Module appears in

Bachelor' degree (1 major) Biology (2011) Bachelor' degree (1 major) Biology (2010) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major, 1 minor) Biology (Minor, 2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 82 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title					Abbreviation		
Electro	Electronics				11-A2-092-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)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites	i			
1 semester undergraduate		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 coils ar cuits: d	Principles of electronic components and circuits. Analogous circuit technology: Passive (resistors, capacitors, coils and diodes) and active components (bipolar and field-effect transistors, operational amplifiers). Digital circuits: different types of gates and CMOS circuits. Microcontroller						
Intende	ed learı	ning outcomes					
The stu circuit f	dents l technol	nave knowledge of the logy.	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 Ge	rman)			
V + Ü (r	no infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)		
Method module is	d of ass s 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	
written Assess and wil examin	examin ment o Il be an nation r	nation (approx. 90 min ffered: When and how nounced in due form u egulations) 2009.	utes) often assessment will l nder observance of Sec	be offered depends of the offered depends of the offered dependence of the offered set of the offere set of the offered set of	on the method of ass 3 ASPO (general aca	sessment demic and	
Allocat	ion of p	olaces					
Only as	s part o	f pool of general key sl	kills (ASQ): 15 places. P	laces will be allocate	ed by lot.		
Additio	nal inf	ormation					
Worklo	ad						
Teachi	ng cycl	e					
Referre	d to in	LPO I (examination regulati	ons for teaching-degree progra	ummes)			
Module	e appea	nrs in					
Bachel Bachel Bachel Master	or' deg or' deg or' deg 's degr	ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Nanostru ee (1 major) Physics (20	2010) 2012) 2012 Technology (2012) 2011))			
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data rece	rrg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 83 / 250	



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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 84 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title					Abbreviation		
Principles of two- and threedimensional Röntgen imaging 11-ZDR-111-n					11-ZDR-111-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)			
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 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	nts						
Physic: ton abs project traction characc Intende The stu technic Course V + R (r Metho module is a) writt groups project (appro:	s of X-ra sorption tion, Fo n, visua terisati adents a ques us s (type, r no infor d of ass s creditab ten exan s (approt t report x. 30 m	ay generation (X-ray tul n, scattering), physics urier reconstruction, its ilisation,). Application on, metrology, biology ning outcomes know the principles of ing X-rays and method number of weekly contact hour mation on SWS (weekl sessment (type, scope, lang le for bonus) mination (approx. 90 n x. 30 minutes per cano (approx. 8 to 10 pages inutes)	bes, synchrotron). Phys of X-ray detection. Matherative methods). Image ons of X-ray imaging in). Radiation protection generating X-rays and of s of image processing a s, language — if other than Gen y contact hours) and con guage — if other than German, ninutes) or b) oral exam- lidate, for modules with , time to complete: 1 to	ics of the interaction nematics of reconstru- e processing (image the industrial sector on and biological rac of their interactions v as well as applicatio rman) ourse language avail examination offered — if no ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese	a between X-rays and uction algorithms (fil data pre-processing (component testing, diation effect (dose, with matter. They kno n areas of these met able) able) able) able each or oral exact edits approx. 20 min entation/seminar pre	I matter (pho- tered rear , feature ex- material). w imaging hods. ion on whether amination in nutes) or c) esentation	
Assess and wi	ment o Il be an	ffered: When and how nounced in due form u	often assessment will I nder observance of Se	be offered depends of the contract of the cont	on the method of ass 3 ASPO (general aca	sessment demic and	
		laces					
Additic	onal inf	ormation					
Worklo	ad						
Teachi	ng cycl	e					
Referre	ed to in	LPOI (examination regulation	ons for teaching-degree progra	immes)			
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data rec	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 85 / 250	

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

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 86 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation	
Current Topics in Experimental Physics 11-BXE5-112-m01					11-BXE5-112-m01
Module coordinator				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)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or study	topics / abroa	of Experimental Physics. Id.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	d learr	ning outcomes			
The stur sics of t underst classify	dents ł he Bac and th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and s knowledge. They are able to
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	ourse 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 in group weeks) Langua	en exar os (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Workloa	ad				
Teachin	ıg cycl	9			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	in and the second se			
Bachelo	or' deg	ree (1 major) Physics (20:	10)		
Bachelor' degree (1 major) Physics (2012)					

Module title				Abbreviation	
Current Topics in Experimental Physics 11-BXE6-112-mc					11-BXE6-112-m01
Module coordinator				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	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current study a	topics broad.	in Experimental Physics.	Credited academic a	achievements, e.g. in	case of change of university or
Intende	ed learr	ning outcomes			
The stu sics of t underst classify	dents l the Bac tand th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli assary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and knowledge. They are able to
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	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 in group weeks) Langua	en exar os (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan didate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocation of places					
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	appea	in and a second s			
Bachelo	or' deg	ree (1 major) Physics (20	10)		
Bachelor' degree (1 major) Physics (2012)					

Module title				Abbreviation	
Current Topics in Experimental Physics					11-BXE8-112-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 semes	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current study a	topics broad.	in Experimental Physics.	Credited academic a	achievements, e.g. in	case of change of university or
Intende	ed learr	ning outcomes			
The stu sics of t underst classify	dents l the Bac tand th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements of a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and 5 knowledge. They are able to
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	ourse language availa	able)
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
a) writte in group weeks) Langua	en exar ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pres ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocati	Allocation of places				
Additio	nal info	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	ars in			
Bachelo	or' deg	ree (1 major) Physics (201	10)		
Bachelo	Bachelor' degree (1 major) Physics (2012)				

Module title Abbreviation				Abbreviation	
Current Topics in Theoretical Physics 11-BXT5-112					11-BXT5-112-m01
Module coordinator				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)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Approval by examination	ation committee requ	uired.
Conten	ts				
Current study a	topics broad.	in Theoretical Physics. C	redited academic ach	nievements, e.g. in c	ase of change of university or
Intende	d learr	ning outcomes			
The stur sics of t Physics blems c	dents l he Bac and h of Theo	nave advanced competer chelor's programme. They ave mastered the require retical Physics.	cies corresponding t v have advanced spec d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-
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 in group weeks) Langua	en exar os (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Workloa	ad				
Teachin	ıg cycl	9			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	in and a second s			
Bachelo	or' deg	ree (1 major) Physics (201	10)		
Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 90 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbrevia				Abbreviation		
Current	Current Topics in Theoretical Physics				11-BXT6-112-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)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate				
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 Physics blems c	dents h the Bac and h of Theo	nave advanced competer chelor's programme. They ave mastered the require retical Physics.	ncies corresponding t v have advanced spea d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-	
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	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 in group weeks) Langua	en exar ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pres ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination o pages, time to complete: 1 to 4	
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)		
Module	appea	ars in				
Bachelo	or' deg	ree (1 major) Physics (201	10)			
Bachelor' degree (1 major) Physics (2012)						

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 91 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation					Abbreviation
Current	Topics	s in Theoretical Physics			11-BXT8-112-m01
Module coordinator				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	undergraduate	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 Physics blems o	dents l the Bac and h of Theo	nave advanced competer chelor's programme. They ave mastered the require retical Physics.	icies corresponding t v have advanced spea d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-
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	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
a) writte in grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	ars in			
Bachelo	or' deg	ree (1 major) Physics (20:	10)		
Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 92 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Thermod	lynam	ics and Economics			11-TDOE-141-m01	
Module	coordi	nator		Module offered by		
Managin and Astro	ng Dire ophys	ctor of the Institute of Th ics	eoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS I	Metho	d of grading	Only after succ. con	ıpl. of module(s)		
3 ((not) s	uccessfully completed				
Duration	n	Module level	Other prerequisites			
1 semest	ter	graduate				
Contents	5					
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. NOTE: this is the module that was run by Prof. Dr. R. Kümmel, who has now retired. As the module was tailored to						
Courses	(type, n	umber of weekly contact hours, la	anguage — if other than Ger	rman)		
V (no info	ormat	ion on SWS (weekly cont	act hours) and cours	e language available)	
Method module is c	of ass	essment (type, scope, languag e for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether	
a) writter in groups weeks) o	n exan s (app or d) pi	nination (approx. 90 min rox. 30 minutes per canc 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 o minutes)	date each or oral examination o pages, time to complete: 1 to 4	
Allocatio	on of p	laces				
Addition	Additional information					
Workloa	d					
Teaching	g cycle	2				
Referred	l to in	LPOI (examination regulations	for teaching-degree progra	mmes)		

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 93 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg ● generated 26-Aug-2024 ● exam.	page 94 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation				
Image and Signal Processing in Physics					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	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 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 anow.					
Conten	ts							
Periodi and im convolu- getic ol transfo Intende The stu- les of in ferent r Course V + R (r Methoo module is a) writt (approx d) pres Assess and will examin	Contents Periodic and aperiodic signals; principles of discreet and exact Fourier transformation; principles of digital signal and image processing; discretisation of signals/sampling theorem (Shannon); homogeneous and linear filters, convolution product; tapering functions and interpolation of images; the Parsival theorem, correlation and energetic observation; statistical signals, image noise, moments, stationary signals; tomography: Hankel and Radon transformation. Intended learning outcomes The students have advanced knowledge of digital image and signal processing. They know the physical principles of image processing and are familiar with different methods of signal processing. They are able to explain different methods and to implement them, especially in the field of tomography. 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 (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							
Allocat	ion of I	places						
Additional information								
Workload								
Teachi	ng cycl	e						
	-							
Referre	ed to in	LPO I (examination regulation	ions for teaching-degree progra	immes)				
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 95 / 250		

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg ● generated 26-Aug-2024 ● exam.	page 96 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	1

Module title				Abbreviation		
Image a	and Sig	nal Processing in Phy	sics		11-BSV-131-m01	
Module	coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of	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	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	s must be met to qua rer will inform stude the course. Registrat n of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th	alify for admission to nts about the respec- ion for the course wi hission to assessmen r admission to asses will put their registra t all prerequisites wi e subsequent semes	o as- ctive details Il be con- nt. If stu- ssment over ation for as- till be admit- sters.	
Conten	ts					
Periodi and ima convolu getic ob transfo	c and a age pro ution pro oservat rmatior	periodic signals; princ cessing; discretisation roduct; tapering functi ion; statistical signals n.	iples of discreet and ex n of signals/sampling th ons and interpolation o , image noise, moments	act Fourier transforn neorem (Shannon); h f images; the Parsiva s, stationary signals;	nation; principles of nomogeneous and lin al theorem, correlation tomography: Hanke	digital signal near filters, on and ener- el and Radon
Intende	ed learr	ning outcomes				
The stu les of ir ferent r	dents ł nage p nethod	nave advanced knowle rocessing and are fam s and to implement th	dge of digital image an iliar with different meth em, especially in the fie	d signal processing. ods of signal proces eld of tomography.	They know the phys sing. They are able t	ical princip- o explain dif-
Course	S (type, n	umber of weekly contact hou	rs, language — if other than Ger	rman)		
V + R (n	o infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	e essment (type, scope, lang le for bonus)	guage — if other than German, o	examination offered — if no	t every semester, informati	on on whether
a) writte in grou weeks) 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) 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 iplete: 1 to 4 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	e appea	irs in				
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 97 / 250

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)

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	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation	
Principles of Biochemistry					08-BC-132-m01
Module	coord	inator		Module offered by	
holder	of the C	hair of Biochemistry		Chair of Biochemist	try
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	undergraduate			
Conten	ts				
Compri mistry.	sing leo	ctures and exercises, this	s module acquaints s	tudents with the fun	damental principles of bioche-
Intende	ed learr	ning outcomes			
Studen [.] key bio	ts have chemic	become familiar with the al processes in cellular s	e fundamental princi systems.	ples of biochemistry	. They are able to describe the
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
This mo compor • 0 • 0	odule co nent. 8-BC-1- 8-BC-2	omprises 2 module comp 132: V + Ü (no informatic 132: V + Ü (no informatic	oonents. Information on on SWS (weekly co on on SWS (weekly co	on courses will be li intact hours) and co ontact hours) and co	sted separately for each module urse language available) urse language available)
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
Assessi low. Un vidual a	ment ir less sta assessr	this module comprises ated otherwise, successf nents.	the assessments in t ul completion of the	he individual module module will require s	e components as specified be- successful completion of all indi-
Assess	ment ir ECTS, f vritten e ment ir ECTS, f vritten e	module component o8- Method of grading: nume examination (approx. 60 module component o8- Method of grading: nume examination (approx. 60	BC-1-132: Principles (erical grade to 90 minutes) BC-2-132: Principles erical grade to 90 minutes)	of Biochemistry 1 Pri of Biochemistry 2 Pr	nciples of Biochemistry 1 inciples of Biochemistry 2
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
Teaching cycle					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				
Module appears in					
Bachelo Bachelo Master'	Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Physics (2010) Master's degree (1 major) Chemistry (2013)				

Bachelor's with 1 n	ajor Physics (2010)
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Module title			Abbreviation	
Biochemistry (teaching degree for secondary schools)08-BC-LAGY-092-m01			08-BC-LAGY-092-m01	
Module coordinator Module offered			Module offered by	
holder of t	he Chair of Biochemistry		Chair of Biochemist	try
ECTS M	ethod of grading	Only after succ. com	pl. of module(s)	
3 nu	Imerical grade			
Duration	Module level	Other prerequisites		
1 semeste	r undergraduate	Admission prerequisite to assessment: successful completion of exerci- ses in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regu- lar attendance of exercises (usually a maximum of 2 incidents of unexcu- sed absence).		
Contents		-		
Comprisin mistry.	g lectures and exercises, this	s module acquaints s	tudents with the fun	damental principles of bioche-
Intended l	earning outcomes			
Students h key bioche	nave become familiar with th emical processes in cellular s	e fundamental princi systems.	ples of biochemistry	. They are able to describe the
Courses (ty	pe, number of weekly contact hours, l	anguage — if other than Ger	man)	
V + Ü (no i	nformation on SWS (weekly o	contact hours) and co	ourse language avail	able)
Method of module is created	assessment (type, scope, langua ditable for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
a) 1 to 3 wi or 90 minu each (app Language	ritten examinations (1 writter utes each; 3 written examina rox. 20 minutes) or c) oral ex of assessment: German or Er	n examination: appro tions: approx. 60 min amination in groups (nglish	x. 90 minutes; 2 writ nutes each) or b) oral (groups of 2, approx	ten examinations: approx. 60 l examination of one candidate . 30 minutes)
Allocation of places				
Additional	linformation			
Workload				
Teaching cycle				
Referred to in LPO I (examination regulations for teaching-degree programmes)				
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"				
Module appears in				
Bachelor' degree (1 major) Physics (2010)				
Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012)				
First state examination for the teaching degree Gymnasium Chemistry (2009)				

Bachelor's with 1 major Physics (2010)	JMU Würzburg • gene
	reg data record Bache



Solid State Physics and Nanostructures

(ECTS credits)

Modules for advanced Bachelor's students offered by the Faculty with regard to preparation for Bachelor's thesis and specialisation in Master's programme.

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 101 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Opto-electronic Material Properties			11-MOE-092-m01			
Module coordinator				Module offered by		
Managing Director of the Institute of Applied Physics Faculty of Phys		Faculty of Physics a	nd Astronomy			
ECTS Method of grading Only after succ. compl. of module(s)		npl. of module(s)				
5	nume	rical grade		•		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	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	al princ	iples of optoelectronic	material properties an	d applications.		
Intende	ed lear	ning outcomes				
The stu	dents	know the principles of	optoelectronic material	characteristics.		
Course	S (type r	number of weekly contact hou	s language — if other than Ge	rman)		
V LÜ (r	o info	mation on SWS (wook	v contact hours) and co	urso languago avail	abla)	
Method module is	d of ass	sessment (type, scope, lang	guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
a) writt groups project prox. 3	en exa (appro report o minu	mination (approx. 90 n x. 30 minutes per cano (approx. 10 pages, tim tes)	ninutes) or b) oral exam lidate, for modules with e to complete: 1 to 4 we	ination of one candi n less than 4 ECTS cr eeks) or d) presentat	date each or oral ex edits approx. 20 mir ion/seminar presen	amination in 1utes) or c) tation (ap-
Allocation of places						
Additio	Additional information					
Worklo	ad					
Potorrod to in LPO L (maning the analytics for the bigs down and the bigs of the bigs down and the bigs of the big						
Keleneu to m LFOT (examination regulations for teaching-degree programmes)						
Module appears in						
Module appears in						
Bachelor degree (1 major) Physics (2010) Master's degree (1 major) Physics (2010)						
Master's degree (1 major) rechnology of Functional Materials (2010)						
Master's degree (1 major) Technology of Functional Materials (2009)						
Master's degree (1 major) Nanostructure Technology (2010)						
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)						
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data rec	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 102 / 250



Master's degree (1 major) FOKUS Physics (2010) Master's degree (1 major) Functional Materials (2012)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 103 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Applied Superconduction		11-ASL-092-m01				
Module coordinator			Module offered by			
Managing Director of the Institute of Applied Physics		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 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 fo admission to assessment anew.) as- tive details Il be con- nt. If stu- sment over tion for as- till be admit- ster. For as- alification for
Conten	ts					
Physica thods o	al princ of mate	iples of superconducti rials sciences for the c	vity. Application in ene alculation of temperatu	rgy engineering. Inst Ire profiles in superc	rumental developme onductors.	ents. Me-
Intende	ed lear	ning outcomes				
The stu are abl able to energy	idents l e to eva discus techno	nave a basic understar aluate the contribution s questions on superc logy. Furthermore, the	nding of superconductives s of materials sciences onductivity in a scientify y can deal with practica	vity as a macroscopio to the development fic manner and to crit al mathematical ques	c quantum phenome of superconductivity tically question deve stions.	non. They /. They are lopments of
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)						
module is	d of ass s 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 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (ap- prox. 30 minutes) Assessment offered: once a year, winter semester						
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						
Bachelor' degree (1 major) Physics (2010)						
Bachelor's	with 1 ma	or Physics (2010)	JMU Würzbu reg. data rec	irg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 104 / 250

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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 (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 105 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation			Abbreviation		
Semiconductor Lasers - Principles and Current Research				11-HLF-092-m01	
Module coordinator		Module offered by			
Managing Director of the Institute of Applied Physics		Faculty of Physics a	and 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	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		Į.		
model, hold co riers an des, las ductor cade la	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 efformance 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-
Intended learning outcomes					
The stu knowle	dents l dge to	nave advanced knowledg modern questions and k	ge of the principles of now the applications	semiconductor-lase in the current devel	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	R + V (no information on SWS (weekly contact hours) and course language available)				
Methoo module is	d of ass creditab	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					
Allocation of places					
Additio	Additional information				
Worklo	Workload				

Teaching cycle

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

Referred to in LFOT (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 107 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title		Abbreviation	
Applied Semiconductor Physics		11-AHL-092-m01	
Module coordinator			
oplied Physics	Faculty of Physics a	and Astronomy	
Only after succ. com	pl. of module(s)		
Other prerequisites			
Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective detail 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 admi 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		alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for	
Semiconductor Phys onics and photonics.	ics and provides an	exemplary overview of the main	
· · ·			
The students know the characteristics of semiconductors, they have gained an overview of the electronic and phonon band structures of important semiconductors and the resulting electronic, optical and thermal properties. They know the principles of charge transport as well as the Poisson, Boltzmann and continuity equation for the solution of questions. They have gained insights into the methods of semiconductor production and are familiar with the theories of planar technology and recent developments in this field, they have a basic understanding of component production. They understand the structure and way of functioning of the main components of electronics (diode, transistor, field-effect transistor, thyristor, diac, triac), of microwave applications (tunnel, Impatt, Baritt or Gunn diode) and of optoelectronics (photo diode, solar cell, light-emitting diode, semiconductor injection laser), they know the realisation possibilities of low-dimensional charge carrier systems on the basis of semiconductors and their technological relevance, they are familiar with current developments in the field of			
anguage — if other than Ger	man)		
contact hours) and co	urse language avail	able)	
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 			
Allocation of places			
Additional information			
	oplied Physics Only after succ. com Other prerequisites Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the set sessment into effect ted to assessment in sessment at a later of admission to assess Semiconductor Phys prices and photonics. Of semiconductors, the emiconductors and the etransport as well as ained insights into the ology and recent devenderstand the structure tet transistor, thyristore electronics (photo diction ical relevance, they and anguage — if other than German, emitted of the structures of the set set observance of Second contact hours) and cond ge — if other than German, emitted the assessment will the der observance of Second contact second contact hours of the second and the structures of the second and the second be	Module offered by oplied Physics Faculty of Physics a Only after succ. compl. of module(s) Other prerequisites Other prerequisites must be met to quisessment. The lecturer will inform stude at the beginning of the course. Registrat sidered a declaration of will to seek adin dents have obtained the qualification for the course of the semester, the lecturer sessment into effect. Students who meet ted to assessment in the current or in th sessment at a later date, students will h admission to assessment anew. Semiconductor Physics and provides an onics and photonics. of semiconductors, they have gained an ore emiconductors and the resulting electror e transport as well as the Poisson, Boltzn ained insights into the methods of semicor ology and recent developments in this fire inderstand the structure and way of functifect transistor, thyristor, diac, triac), of mice electronics (photo diode, solar cell, lightion possibilities of low-dimensional charging ical relevance, they are familiar with curre anguage – if other than German) contact hours) and course language avail ge – if other than German (standard) and course language avail in the structure of section 32 Subsection (lish	
Workload

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) Nanostructure Technology (2010) Master's degree (1 major) Mathematics (2010) Master's degree (1 major) Physics (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 109 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Calld Chata DI				ADDIEVIALIUII	
Solid State Physics 2 11-FK2-092-m01					
Module coordinator			Module offered by		
Managing Direc	tor of the Institute of	Applied Physics	plied Physics Faculty of Physics and Astronomy		
ECTS Method	l of grading	Only after succ. con	pl. of module(s)		
8 numerio	cal grade				
Duration M	Module level	Other prerequisites			
1 semestergraduateCertain 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 assess the course of the semester, the lecturer will put their registrati sessment into effect. Students who meet all prerequisites will ted to assessment in the current or in the subsequent semester admission to account the qualification for the semester and the qualification for the semester and the sem			o as- ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for		
Contents					
Advanced Solid cal model. Diele citations and or	l-State Physics. Electr ectric properties and ptical properties [opti	ons in periodic potenti ferroelectrics. Semicon onal]	al - the band structur ductors. Magnetism.	re. Dynamics in the s Superconductivity.	semi-classi- Coupled ex-
Intended learni	ng outcomes				
The students ha	ave specific and adva in a sub-discipline of	nced knowledge in the Solid-State Physics.	field of Solid-State F	Physics. They are the	oretically ab-
Courses (type, nur	mber of weekly contact hour	s, language — if other than Gei	man)		
R + V (no inform	nation on SWS (weekl	y contact hours) and co	urse language availa	able)	
Method of asse module is creditable	ssment (type, scope, lang for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
a) written exam groups (approx. project report (a (approx. 30 min Assessment off and will be ann examination reg Language of ass	ination (approx. 90 n . 30 minutes per cano approx. 8 to 10 pages nutes) ered: When and how ounced in due form u gulations) 2009. sessment: German, E	ninutes) or b) oral exam lidate, 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 pe offered depends o tion 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
Allocation of pla	aces				
Additional infor	rmation				
Workload					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
Bachelor's with 1 major	r Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 110 / 250



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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 111 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title					Abbreviation	
Solid State Spectroscopy				11-FKS-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. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i		
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 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 registratio sessment into effect. Students who meet all prerequisites will b ted to assessment in the current or in the subsequent semester sessment at a later date, students will have to obtain the qualification to accompany			o as- ctive details Il be con- nt. If stu- ssment over ition for as- ill be admit- ster. For as- alification for			
Conten	ts					
Single- spectro	and mascopy.	any-particle picture of X-ray spectroscopies.	electrons in solids. Ligł	nt-matter interaction.	Optical spectrosco	oy. Electron
Intende	ed learı	ning outcomes				
The stu types o develop	dents l f spect oments	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 the current
Course	S (type, n	umber of weekly contact hou	rs, language — if other than Ge	rman)		
R + V (n	o infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)	
Methoo module is	l of ass creditab	essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informat	on on whether
a) writte groups project (approx Assessi 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	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				
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data rec	ırg ● generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 112 / 250

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) 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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 113 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title					Abbreviation	
Transport Phenomena in Solids					11-FKT-092-m01	
Module coordinator Mo				Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of T sics	heoretical Physics	eoretical Physics Faculty of Physics 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 semes	ster	graduate	Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective detail 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 admi 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			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					
Transpo	ort phe	nomena in solids.				
Intende	d learı	ning outcomes				
The stu	dents l	nave specific and advan	ced knowledge in the	field of transport ph	enomena in solids.	
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 avail	able)	
Method module is	l of ass creditab	essment (type, scope, langu le for bonus)	age — 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	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						
Teaching cycle						
Reterred 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's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data rece	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 114 / 250

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

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 115 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	Module title Abbreviation						
Semiconductor Physics 11-HLP-092-m01							
Module coordinator				Module offered by			
Managing Director of the Institute of Ap			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	n	Module level	Other prerequisites	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.				
Conten	ts						
Advance ons and sation of Intende	ed exa d their effects ed learn dents l	mination of crystal bor coupling effects. Electr of semiconductors wit ning outcomes nave specific and adva	nding and the electronic on-phonon coupling. T h reduced dimensions. nced knowledge in the	c band structure of s emperature-depende (Semi-)magnetic ser field of Semiconduc	emiconductors. Opti ent transport propert miconductors. tor Physics. They kn	ical excitati- ties. Quanti- ow the physi-	
cal prin materia	iciples als.	of semiconductors and	have gained an overvi	ew of the important	characteristics of se	miconductor	
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)		
Methoo module is	d of ass creditab	sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	ot 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)							
Bachelor's	with 1 ma	or Physics (2010)	JMU Würzbu reg. data rec	irg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 116 / 250	

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

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 117 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title					Abbreviation	
Semico	Semiconductor Nanostructures				11-HNS-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Ap			oplied Physics	Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	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 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 at a later date, students will have to obtain the qualific			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- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for			
Conten	ts		·			
or maci ging th tures o with a f of nove for qua	roscopi eir size f varyin focus o el optoe ntum c	ic 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 D). It provides the bas light-matter coupling hotonic devices base tum computing archi	tic properties can be ges in the preparatio sic theoretical conce . Moreover, it discus ed on such nanostru- tectures.	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 lear	ning outcomes				
The stu knowle devices	dents 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 s in this field of resea	tor nanostructures. They have eir applications to novel photonic arch.	
Course	S (type, r	number 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	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						
Allocat	Allocation of places					
Additional information						
Worklo	Workload					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 118 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

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) 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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 119 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Lithography in Semiconductor Technology and Theory of Quantum Transport 11-LHQ-092-m01						
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Ap		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 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 at a later date, students will have to obtain the qualification for in the qualification for admission to assessment admission to assessment anew.		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					
Introdu on qua	iction te ntum ti	o the lithographic tech ransport.	niques of semiconduct	or technology and di	scussion of the requ	ired theory
Intende	ed lear	ning outcomes				
The stu transpo	idents ort.	have specific and adva	nced knowledge of sen	niconductor lithogra	ohy and of the theor	y of quantum
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)	
Methoo 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, 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	
Allocat	ion of _l	olaces				
Additio	onal inf	ormation				
	_					
Worklo	ad					
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)			
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data rec	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 120 / 250

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

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 121 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	1

Module title			Abbreviation			
Magnetism			11-MAG-092-m01			
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	Inly after succ. compl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme:	ster	r 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 admited 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 assessment anew		o as- ctive details ill be con- nt. If stu- ssment over ation for as- till be admit- ster. For as- alification for		
Conten	ts					
Dia- and ture, na fect.	d parar Inomag	nagnetism, exchange i gnetism, superparamag	nteraction, ferromagne metism, experimental i	tism, antiferromagne methods to measure	etism, anisotropy, de magnetic properties	omain struc- s, Kondo ef-
Intende	ed learr	ning outcomes				
The stu experin ches ar on prob	dents l nents; f id are a olems c	know basic terms, conc they are skilled in simp able to apply them to ta of these areas; they are	epts and phenomena of le model building and sks in the stated areas able to evaluate the ac	of magnetism and m in the formulation of s; they have compete ccuracy of observatio	easuring methods for mathematical-phys encies in independer ons and analyses.	or magnetic ical approa- ntly working
Course	S (type, n	umber of weekly contact hour	s, language — if other than Ger	man)		
R + V (n	o infor	mation on SWS (weekly	/ contact hours) and co	ourse language avail	able)	
Methoo 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) 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				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 122 / 250

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) 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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 123 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

B

Module title		Abbreviation			
Magnetism and Spin Transport		11-MST-092-m01			
Module coordinator			Module offered by		
Managi	ng 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)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
2 seme	ster	graduate Certain prerequisites must be met to qualify for admission to as- sessment. The lecturer will inform students about the respective detail 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 admi 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			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- at all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for
Conten	ts				
The module spans two semesters. During the winter semester, the students become acquainted with the princip- les of magnetism (ranging from atoms to solids), properties of magnetic material (individual usage) and methods to characterise magnetic properties. During the summer semester, the students learn about spin transport in me- tallic systems in due consideration of giant magnetoresistance and tunnel magnetoresistance and its applica- tion in magnetic memory. As a last point, we discuss new phenomena from the field of spin dynamics and cur- rent-induced spin phenomena. Intended learning outcomes The students know the basic terms, concepts and phenomena of magnetism and measuring methods for magne- tic experiments; they are familiar with spin transport applications of information technologies and have gained an overview of modern findings in this area (GMR, TMR). They are skilled in simple model building and in the for-					
Courses (type, pumber of weakly contact hours, language, if other than (compa)					
V + R + V	Courses (type, number of weekly contact nours, language $-$ if other than German) V + P + 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. 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	nal inf	ormation			
Workloa	ad				

achelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.		
	reg. data record Bachelor (180 ECTS) Physik - 2010		

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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 (2010)

Master's degree (1 major) Physics (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 125 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title	Module title		Abbreviation	
Nanoanalytics			11-NAN-092-m01	
Module coordinator			Module offered by	
Managing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy
ECTS Metho	od of grading	Only after succ. com	npl. of module(s)	
6 nume	rical grade			
Duration	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 qualification		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- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for		
Contents	<u> </u>			
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 microsco- py. Scanning tunneling microscopy Electron probes: Scanning electron microscope. Transmission electron mi- croscope 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 le- vel. They know microscoping procedures that are used in practice in labs and the industry as well as spectrosco- pic methods for the determination of electronic properties. They are able to evaluate the efficiency of different re- search 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				
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				

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 126 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

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 (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 127 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

					·			
Module	e title				Abbreviation			
Low-Dimensional Structures			11-NDS-092-m01					
Module coordinator				Module offered by				
Managing Director of the Institute of Applied Physics Faculty of Physics			and Astronomy					
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
4	nume	rical grade						
Duratio	on .	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					
Conter	its							
Low-di nal stru epitaxy	mensio uctures /.	nal structures: Crystal . Comparison between	lattice symmetry. Lattic these structures and ve	e dynamics and gro olume solids. X-ray o	wth techniques of lo liffractometry. Molec	w-dimensio- cular beam		
Intend	ed lear	ning outcomes						
know n semico odes. 1 evalua dimens band s familia free ele tor and and are two-dir	The 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					ost important d MOS-di- des and can als in one the 2D sub- oping and are operties of a n, filling fac- filling factor, scitations in		
Course	S (type, r	number of weekly contact hou	rs, language — if other than Ge	rman)				
R + V (r	no infor	mation on SWS (week	ly contact hours) and co	ourse language avail	able)			
Metho module is	d of ass s creditab	essment (type, scope, lan 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. Language of assessment: German, English								
Allocation of places								
Additional information								
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data rec	irg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. sik - 2010	page 128 / 250		

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) 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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 129 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Bachelor's with 1 major Physics (2010)

Module title					Abbreviation
Nanoelectronics					11-NEL-092-m01
Module coordinator				Module offered by	
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	ed 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				
Afterwa functio of nano the ope	ture an s terms ards, we n of con ostructu erating	a the corresponding exer such as Fermi distributio e talk about application p mmon switches and stora ires. We gain an overviev principle of quantum cor	rcises convey basic co on, density of states a potentials of nanostru ages through miniatu v of nanoelectric amp nputers.	oncepts of electronic and carrier concentra uctures in electronics risation and compar olifiers, rectifier, logic	tion in view of small structures. We examine the limits of the them to electronic properties clattices and circuits and discuss
The stu	donte l	ning outcomes	af alactronics of nor	actructures in theor	wand practice. They know functi
ons an	d appli	cations of respective con	ponents.		
Course	S (type, n	umber 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)
Methoe 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) 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	blaces	(1511		
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) Nanostructure Technology (2010)

Master's degree (1 major) Physics (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 131 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e title				Abbreviation	
Nano-Optics					11-NOP-092-m01	
Module coordinator				Module offered by		
Managi	ing Dire	ector of the Institute of A	Applied Physics	Faculty of Physics a	ind 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 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	s must be met to qua rer will inform stude the course. Registrat n of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew.	alify for admission to nts about the respec- ion for the course wi hission to assessmen or admission to asses will put their registra at all prerequisites wi e subsequent semes ave to obtain the qu) as- :tive details Ill be con- nt. If stu- ssment over Ition for as- ill be admit- ster. For as- alification for
Conten	ts					
Theoret quantu	tical pri m emit	inciples. Focussing of li ters. Light emission in r	ght. Microscopy. Optic nano-tailored environn	al nearfield probes. 1ents. Plasmons. Op	Nearfield microscop tical antennas.	y. Single
Intende	ed learı	ning outcomes				
The stu retical p	dents l princip	have specific and advar les and application area	nced knowledge in the as of nano-optics and v	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	, language — if other than Gei	rman)		
R + V (n	io infor	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, informati	ion 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.					amination in nutes) or c) esentation sessment demic and
Allocat	ion of p	olaces	<u> </u>			
Additio	nal inf	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's	with 1 maj	jor Physics (2010)	JMU Würzbu	rg • generated 26-Aug-2024 ord Bachelor (180 FCTS) Phys	• exam. ik - 2010	page 132 / 250

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 133 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e title				Abbreviation	
Quantu	Quantum Mechanics II 11-QM2-092-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)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites	1		
Duration Module level Ot 1 semester undergraduate Ce at sic de th se th se se			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 asses	es must be met to qua irer will inform stude the course. Registrat on of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew.	alify for admission to nts about the respec- ion for the course win hission to assessme or admission to asses will put their registra- et 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- ialification for
Conten	ts					
 "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 concents of the listed topics. They are able to describe or model problems of					gram in elor's de-) be covered ure splitting eleventation me-	
thods a High-Er dents.	and to i nergy P	nterpret the results phy hysics and Condensed	ysically. The course is p Matter/Solid-State Phy	pivotal to subsequen ysics. The course is n	t theory courses in A nandatory for all Ma	Astrophysics, ster's stu-
Course	S (type, n	umber of weekly contact hour	s, language — if other than Ge	rman)		
R + V (n	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Method module is	d of ass creditab	s essment (type, scope, lang le for bonus)	uage — 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. Language of assessment: German, English						
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data rec	rrg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 134 / 250

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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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 135 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e 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 Method of grading Only after succ. compl. of module(s)						
6	nume	rical grade				
Duration Module level Other prerequisites						
1 semester graduate		Certain prerequisite sessment. The lectu 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 for admission to assessment anew.			
Conten	ts					
Quantu Strong	um effe ly corre	cts and phenomena in lated systems	current solid-state rese	earch. Correlations. F	ree electron gas and	l Fermi liquid.
Intend	ed lear	ning outcomes				
The stu quantu retical	idents l im effeo descrip	nave specific, advance tts in strongly correlate tion of such systems a	d knowledge of the cur ed systems. They are ab and the current experim	rent research on Soli le to understand the ental results.	d-State Physics, esp connections betwe	ecially on en the theo-
Course	S (type, r	umber of weekly contact hou	rs, language — if other than Ge	rman)		
R + V (r	no infor	mation on SWS (week	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	t every semester, informat	ion on whether
a) writt groups project (approz Assess and wil examir Langua	en exai (appro report x. 30 m ment o Il be an nation r age 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 L egulations) 2009. ssessment: German, E	ninutes) or b) oral exam didate, for modules with , time to complete: 1 to often assessment will Inder 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 ex edits approx. 20 mir entation/seminar pro on the method of ase 3 ASPO (general aca	amination in nutes) or c) esentation sessment demic and
Allocat	ion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	nrs in				
Bachelor's	with 1 ma	or Physics (2010)	JMU Würzbu reg. data rec	rrg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 136 / 250



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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 137 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Bachelor's with 1 major Physics (2010)

Module title			Abbreviation		
Many Body Quantum Theory			11-QVTP-092-m01		
Module coordinator				Module offered by	
Managi and Ast	ng Dire trophys	ector of the Institute of Tl sics	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 semes	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 for		
Conten	ts				
Green's functions. An outline could be: 1 Single-particle Green's function 2 Review of second quantization 3 Diagrammatic method using many particle Green's functions at temperature T=0 4 Diagrammatic method for finite T 5 Landau theory of Fermi liquids 6 Superconductivity 7 One dimensional systems and beconization					
Intende	ed learı	ning outcomes			
The stu ply the	dents l acquir	nave mastered the princi ed methods to current pr	ples of quantum field oblems of Theoretica	l theory in many-parl l Solid-State Physics	ticle systems. They are able to ap- 5.
Courses	S (type, n	umber 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)
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 					
Allocation of places					
Additional information					

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Physik - 2010

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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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 139 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Relativistic Effects in Mesoscopic Systems 11-RMS-092-m01 Module coordinator Module offered by Managing Director of the Institute of Theoretical Physics and Astrophysics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other 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 in the course of the semester, the lecturer will put their registration sessment in the course of the semester, the lecturer will put their registration sessment in the extreme to the date, students will have to obtain the qualification to a damission to assessment at a later date, students will have to obtain the qualification to admission to assessment anew. Contents Relativistic effects in mesoscopic systems Spin-orbit coupling Dirac equation Quantum Hall effect. logical insulators Majorana fermions Intended learning outcomes				
Module coordinator Module offered by Managing Director of the Institute of Theoretical Physics and Astrophysics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other 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 into effect. Students who meet all prerequisites will be ted to assessment in the current or in the subsequent semester. sessment an ew. Contents Relativistic effects in mesoscopic systems Spin-orbit coupling Dirac equation Quantum Hall effect. Ingical insulators Majorana fermions				
Managing Director of the Institute of Theoretical Physics and Astronomy Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other 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 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 to assessment admission to assessment anew. Contents Relativistic effects in mesoscopic systems Spin-orbit coupling Dirac equation Quantum Hall effect. logical insulators Majorana fermions				
ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester 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 qualific admission to assessment admission to assessment anew. Contents Relativistic effects in mesoscopic systems Spin-orbit coupling Dirac equation Quantum Hall effect. logical insulators Majorana fermions Intended learning outcomes Intended learning outcomes				
5 numerical grade Duration Module level Other prerequisites 1 semester 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 qualific admission to assessment admission to assessment anew. Contents Relativistic effects in mesoscopic systems Spin-orbit coupling Dirac equation Quantum Hall effect. logical insulators Majorana fermions Intended learning outcomes The deta material preceduation of the semester.				
DurationModule levelOther prerequisites1 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. 				
1 semester 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 qualific admission to assessment anew. Contents Relativistic effects in mesoscopic systems Spin-orbit coupling Dirac equation Quantum Hall effect. logical insulators Majorana fermions				
Contents Relativistic effects in mesoscopic systems Spin-orbit coupling Dirac equation Quantum Hall effect. logical insulators Majorana fermions Intended learning outcomes	5- e details be con- lf stu- nent over n for as- be admit- r. For as- fication for			
Relativistic effects in mesoscopic systems Spin-orbit coupling Dirac equation Quantum Hall effect. logical insulators Majorana fermions Intended learning outcomes				
Intended learning outcomes	t Topo-			
The students have mastered the mathematical methods for the description of relativistic quantum syste especially in the field of mesoscopic physics. They are able to apply their knowledge to simple systems.	ems, S.			
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 module is creditable for bonus)	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				
Referred to in LPO I (examination regulations for teaching-degree programmes)				
Module appears in				
Bachelor's with 1 major Physics (2010) JMU Würzburg • generated 26-Aug-2024 • exam. page 140 reg. data record Bachelor (180 ECTS) Physik - 2010 Physik - 2010 Physik - 2010				



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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 141 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Theoretical Solid State Physics			11-TFK-092-m01			
Module coordinator				Module offered by		
Managing Director of the Institute of Theoreti and Astrophysics			heoretical Physics	Faculty of Physics and 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 semes	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 for admission to assessment an aver		as- tive details Il be con- nt. If stu- ssment over tion for as- Il be admit- ster. For as- alification for	
Conten	ts					
Principl thods. I	es of T Nagnet	heoretical Solid-State P tism. Superconductivity	hysics. Fermi liquid th	eory. Electron-electro	on interaction. Varia	tional me-
Intende	d learn	ning outcomes				
The students have basic knowledge of the theoretical description of solid-state phenomena. They know the cor- responding mathematical or theoretical methods and are able to apply them to basic problems of solid-state theory and to understand the connections to experimental results. The individual students have elaborated on an advanced topic of solid-state theory and have discussed this topic in a seminar presentation.						
Courses (type, number of weekly contact hours, language — if other than German)						
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)	age — 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						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 142 / 250

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 143 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Bachelor's with 1 major Physics (2010)

Module title			Abbreviation		
Theory of Superconduction					11-TSL-092-m01
Module coordinator				Module offered by	
Managing Director of the Institute of Theoretical Physics and Astrophysics			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	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 for		
Conten	ts				
Introduction to the phenomenom of superconductivity. Microscopic theory of superconductivity (BCS theory). Phenomenological theory of superconductivity (Ginzburg-Landau theory). Mesoscopic aspects of superconducti- vity (Andreev scattering, Bobolioubov-de Gennes equation, SQUIDS). Quantum computing with superconductive elements.					
Intende	ed lear	ning outcomes			
The students have basic knowledge of the theoretical models for the description of superconductivity. They know the properties and application areas of these models and are able to apply calculation methods to simple problems.					
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 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					
Workload					
Teaching cycle					

JMU Würzburg • generated 26-Aug-2024 • exam. reg. data record Bachelor (180 ECTS) Physik - 2010

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

Module appears in

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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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 145 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation	
Semiconductor Physics and Devices				11-SPD-102-m01	
Module coordinator				Module offered by	<u>I</u>
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	npl. of module(s)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	1 semestergraduateCertain 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 in the current or in the subsequent semest sessment at a later date, students will have to obtain the qualification to approximate the set of the semester.			alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for	
Conten	ts				
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	-		
perties equatic on and basic u nents o and Gu ser). Th ductors	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	umber of weekly contact hours. I	Janguage — if other than Ger	rman)	
V + R (r	o 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 le for bonus)	ge — if other than German, e	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					
Additional information					

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 147 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Quantum Transport in Semiconductor Nanostr			or Nanostructures		11-QTH-102-m01	
Module coordinator				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)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i 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	s must be met to qua irer will inform stude the course. Registrat on of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew.	alify for admission to nts about the respec- ion for the course wi hission to assessment r admission to asses will put their registra t all prerequisites w 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					
The lect topics of phenor transpo	ture ad of: ball nena b ort phe	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 lear	ning outcomes				
The stu ons and	dents l d appli	nave mastered the bas cations of respective co	ics of electronics of nai omponents.	nostructures in theor	y and practice. They	know functi-
Course	S (type, r	umber of weekly contact hour	s, language — if other than Ge	rman)		
V + R (n	io infor	mation on SWS (weekl	y 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 nc	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	
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's	with 1 ma	or Physics (2010)	JMU Würzbu reg. data rec	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 148 / 250

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 149 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Renormalization Group Methods in Field Theory					11-RMFT-102-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of The and Astrophysics			Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	numei	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 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 ove 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			o as- ctive details ill be con- nt. If stu- ssment over ation for as- till be admit- ster. For as- alification for
Conten	ts					
Renorm analyse	alisati d beha	on group methods for a aviour of cryogenic tem	non-linear partial differ peratures.	ential equations, fiel	d theoretical contex	ts and non-
Intende	d learr	ning outcomes				
The stu of the re	dents g enorma	gain an overview of nor alisation group methoo	n-linearities in partial d I.	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	y 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,	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 mi ment o l be an ation re ge of a	nination (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 Sec nglish	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese pe 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 info	ormation				
Workloa	ad					
Teaching cycle						
Poferred to in LPO L (avamination regulations for the shine dense are regulated by the shine dense of the sh						
Module appears in						
Bacheloric	with a mai	or Physics (2010)	IMIT \////	rg • generated of Aug occur	evam	Dage 150 / 250
Ducheitor 5 V		or r mysics (2010)	reg. data rec	ord Bachelor (180 ECTS) Physi	ik - 2010	pase 150 / 250



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

Bachelor's with 1 major Physics (2010)	IMU Würzburg • generated 26-Aug-2024 • exam.	page 151 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	F-3J- / -J-

Module title				Abbreviation		
Spintronics					11-SPI-102-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Ap			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	i		
1 semester graduate Certain prerequisites must be met to qualify for a sessment. The lecturer will inform students about at the beginning of the course. Registration for the sidered a declaration of will to seek admission to dents have obtained the qualification for admiss the course of the semester, the lecturer will put the sessment into effect. Students who meet all prerected to assessment at a later date, students will have to ole admission to accompany.			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- ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- ialification for		
Conten	ts					
This lec magnet spin dy	ture co oresist namics	overs the basic principl tance and tunnel magn s and current-induced s	es of spin transport, wi etoresistance. As a las spin phenomena.	th a particular emph t point, we discuss n	asis on the phenom ew phenomena fron	ena of giant n the field of
Intende	ed lear	ning outcomes				
The stu mation nel mag	dents l techno gnetore	know the basic princip blogy. They have gained esistance).	es of spin transport mo d an overview of curren	odels and the applica t findings in this field	ations of spin transp d (giant magnetoresi	ort in infor- istance, tun-
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)		
V + R (n	o infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Methoo module is	l of ass creditab	sessment (type, scope, lang le for bonus)	guage — 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 1utes) 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)						
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data rec	Irg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 152 / 250

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) FOKUS Physics (2006)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 153 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

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Module title					Abbreviation	
Introduction to Electron Microscopy					11-IEM-111-m01	
Module coordinator				Module offered by		
Manag	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)		
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 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			
Conten	ts					
(selecte on tech formati image f 7. Chen spectro	ed-area inique) ion, ima formati nical ar oscopy)	ED, convergent beam ED . 4. Transmission electro aging of microstructure). on, image simulation). 6. nalysis with the electron . 8. Sample preparation.	D, basics of electron of n microscopy (the ins 5. Can we see atoms Scanning electron m microscope (energy-of Electron microscopy	rystallography, com strument, contrast m ? High-resolution ele nicroscopy (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.	
Intended learning outcomes						
The stu They kr copic n	idents l now mic nethod	nave basic knowledge of croscoping procedures th s for chemical analysis. T	modern research me nat are used in practio 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 (r	no infor	mation on SWS (weekly o	contact hours) and co	urse language avail	able)	
Method module is	d of ass s 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					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.
	reg. data record Bachelor (180 ECTS) Physik - 2010

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) 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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 155 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	title				Abbreviation
Current Topics in Experimental Physics			11-BXE5-112-m01		
Module coordinator Module offered by					
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Approval by examination	ation committee req	uired.
Content	ts				
Current or study	topics / abroa	of Experimental Physics. Id.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	d learr	ning outcomes			
The stur sics of t underst classify	dents l he Bac and th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	icies corresponding t v have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and knowledge. They are able to
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) 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)					
Allocation of places					
Additio	nal info	ormation			
Workloa	ad				
Teachin	ig cycl	9			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	irs in			
Bachelo	or' deg	ree (1 major) Physics (20:	lo)		
Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 156 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation				Abbreviation	
Current Topics in Experimental Physics			11-BXE6-112-m01		
Module coordinator Mo			Module offered by	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 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current study a	topics broad.	in Experimental Physics.	Credited academic a	achievements, e.g. ir	a case of change of university or
Intende	ed learı	ning outcomes			
The stu sics of t underst classify	dents l the Bac tand th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements of a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and 5 knowledge. They are able to
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) writte in grou weeks) Langua	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)				
Allocation of places					
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	appea	ars in			
Bachelo	or' deg	ree (1 major) Physics (20:	10)		
Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 157 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation		
Current Topics in Experimental Physics			11-BXE8-112-m01		
Module coordinator 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 semes	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current study a	topics broad.	in Experimental Physics.	Credited academic a	achievements, e.g. in	case of change of university or
Intende	ed learr	ning outcomes			
The stu sics of t underst classify	dents l the Bac tand th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements of a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and 5 knowledge. They are able to
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	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)					
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)					
Allocation of places					
Additio	nal info	ormation			
Worklo	ad				
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	ars in			
Bachelo	or' deg	ree (1 major) Physics (201	10)		
Bachelor' degree (1 major) Physics (2012)					

Module	title				Abbreviation
Current Topics in Theoretical Physics			11-BXT5-112-m01		
Module coordinator Module offered by					
chairpe	rson o	f examination committee		Faculty of Physics a	nd Astronomy
ECTS	S Method of grading		Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current study a	topics broad.	in Theoretical Physics. C	redited academic ach	nievements, e.g. in c	ase of change of university or
Intende	ed leari	ning outcomes			
The stu sics of t Physics blems o	dents l the Bac and h of Theo	have advanced competer chelor's programme. They ave mastered the require retical Physics.	icies corresponding t v have advanced spea d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-
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	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) 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)					
Allocation of places					
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	appea	urs in			
Bachelo	or' deg	ree (1 major) Physics (202	10)		
Bachelo	Bachelor' degree (1 major) Physics (2012)				

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 159 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	title				Abbreviation
Current Topics in Theoretical Physics				11-BXT6-112-m01	
Module coordinator 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)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate			
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	d learr	ning outcomes			
The stur sics of t Physics blems c	dents h he Bac and ha of Theo	nave advanced competer helor's programme. They ave mastered the require retical Physics.	ncies corresponding t v have advanced spea d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-
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) 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)					
Allocation of places					
Additio	nal info	ormation			
Workloa	ad				
Teachin	ig cycl	9			
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	rs in			
Bachelo	or' degi	ree (1 major) Physics (201	10)		
Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 160 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Current	Topics	s in Theoretical Physics			11-BXT8-112-m01	
Module	Module coordinator			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	undergraduate	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 Physics blems o	dents l the Bac and h of Theo	nave advanced competer chelor's programme. They ave mastered the require retical Physics.	icies corresponding t v have advanced spea d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-	
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	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	
a) writte in grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4	
Allocat	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				
Bachelo	or' deg	ree (1 major) Physics (20:	10)			
Bachelo	Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 161 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation			
Physics	s of Ad	vanced Materials			11-PMM-132-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	Only after succ. compl. of module(s)			
6	nume	rical grade		, ,,			
Duratio	n	Module level	Other prerequisites				
	ctor	graduato					
Conton	te	gladuate					
Conten	Concerts						
and su groups	and superconductors; thin films, heterostructures and superlattices. Methods of characterising these material groups; two-dimensional layer materials.						
Intende	ed lear	ning outcomes					
The stu	dents l	know the properties an	d characterising metho	ods of some modern	materials.		
Course	S (type, r	number of weekly contact hour	s, language — if other than Ge	rman)			
V + R (n	no infor	mation on SWS (weekl	contact hours) and co	ourse language avail	able)		
Method	d of ass	sessment (type, scope, lang	uage — if other than German,	examination offered — if no	t every semester, informat	ion on whether	
module is	s creditab	le for bonus)			-		
in grou weeks) Assess and wil examin Langua	ps (app or d) p ment o Il be an ation r	prox. 30 minutes per ca resentation/seminar p ffered: When and how nounced in due form u egulations) 2009. ssessment: German, E	ndidate) or c) project r resentation (approx. 3 often assessment will nder observance of Se nglish	eport (approx. 8 to 10 o minutes) be offered depends o ction 32 Subsection ;	o pages, time to con on the method of as: 3 ASPO (general aca	nplete: 1 to 4 sessment demic and	
Allocat	ion of r	olaces					
Additio	nal inf	ormation					
Additio							
Worklo							
WOIKIO	au						
Teachin	ng cycl	е					
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	ammes)			
Module	e appea	urs in					
Bachel	or' deg	ree (1 major) Physics (2	010)				
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) Nanoshuchure rechnology (2010) Master's degree (1 major) FOKUS Physics (2010)							
Master	Master's degree (1 major) FUKUS Physics (2010) Master's degree (1 major) FOKUS Physics (2011)						
musici	Jacgr		5.05 (2011)				
Bachelor's	with 1 maj	jor Physics (2010)	JMU Würzbı reg. data rec	irg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 162 / 250	



Astro Physics and Particle Physics

(ECTS credits)

Abbr.: AT. Modules for advanced Bachelor's students offered by the Faculty with regard to preparation for Bachelor's thesis and specialisation in Master's programme.

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 163 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				-	Abbreviation	
Astrop	hysics				11-A4-072-m01	
Module	e coord	inator		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				
Duration 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 lat for admission to assessme	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	ts	L				
nistory pes and stellar large-so nucleos Intende The stu physica ons. Th	Person of astronomy, coordinates and time measurement, the solar system, size scales in outer space, telesco- pes and detectors, stellar structure, stellar atmospheres, stellar evolution, final stages of stellar evolution, inter- stellar medium, structure of the Milky Way, local universe, expanding space-time, galaxies, active galactic nuclei, large-scale structure of the universe, Friedmann World Models, thermodynamics of the early universe, primordial nucleosynthesis, cosmic microwave background radiation, structure formation, inflation Intended learning outcomes The students are familiar with the modern world view of Astrophysics. They know methods and tools for astro- physical observations and evaluations. They are able to use these methods to plan and analyse own observati- ons. They know the structure of the universe, a g of stars and galaxies and understand the process of their down					
lopmer	nt.			`		
	S (type, r	umber of weekly contact hour	s, language — if other than Ge	rman)	abla)	
Method	d of as		y contact nours) and co	ovamination offered — if no	able)	ion on whother
module is	creditab	le for bonus)	uage – il other than German,		it every semester, mormat	
written	exami	nation (approx. 120 mii	nutes)			
Allocat	ion of _l	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	Workload					
Referre	Referred to in LPO L (examination regulations for teaching degree programmes)					
Module appears in						
Bachel	or' deg	ree (1 major) Physics (2	2007)			
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu	irg • generated 26-Aug-2024 ord Bachelor (180 FCTS) Phys	• exam. ik - 2010	page 164 / 250





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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 165 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Astrono	omical	Methods			11-ASM-131-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)		
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			
Content	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 reductior	n 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	servational astronomy i ergies). Knowledge of p rvations.	n various parts of th principles and applic	e electromagnetic sp ations of these metl	pectrum (ra- hods and
Courses	5 (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)	
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, informat	ion on whether
a) writte in group weeks) 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) 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 1plete: 1 to 4 sessment demic and
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Toaching cyclo						
 Poferred to in LDO L (
Module appears in						
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 166 / 250



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)

Bachelor's with 1 major Physics (2010)	IMU Würzburg • generated 26-Aug-2024 • exam.	page 167 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

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 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 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 elec 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 learı	ning outcomes				
The stu ma. The	dents l ey are a	know the principles of F Ible 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.
Course	5 (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 availa	able)	
Method module is	l of ass creditab	e essment (type, scope, langu 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.						
Allocati	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
<u></u>						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 • ord Bachelor (180 ECTS) Physi	• exam. k - 2010	page 168 / 250

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 169 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Cosmol	ogy				11-AKM-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)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i i		
1 semester 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 for			
Conten	ts					
Expand matter, and gal	ing spa primoi axy clu	ace-time, Friedmanniar dial nucleosynthesis, d sters, intergalactic me	cosmology, basics of cosmic microwave bacl dium, cosmological pa	general relativity, the ‹ground, structure fo rameters	e early universe, infl rmation, superclust	ation, dark er, galaxies
Intende	ed learr	ning outcomes				
The stu le to rel scientif	dents ł ate the ic ques	nave basic knowledge o em to observations. The stions.	of cosmology. They know by have gained insights	ow 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	s, language — if other than Ge	rman)		
R + V (n	o infor	mation on SWS (weekly	y 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,	examination offered — if no	t every semester, informat	ion on whether
a) writte groups project (approx Assessi 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.					amination in 1utes) or c) esentation sessment demic and
Allocati	ion of p	olaces				
Additional information						
Workload						
Teachir	Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's \	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	irg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 170 / 250



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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.		
	reg. data record Bachelor (180 ECTS) Physik - 2010		

Module title				Abbreviation						
Plasma	Plasma-Astrophysics 11-APL-092-m01									
Module coordinator Module				Module offered by	L					
Managi	ng Dire	ector of the Institute of	Theoretical Physics	Faculty of Physics a	nd Astronomy					
	Metho	ncs	Only after succ. con	nl of module(s)						
6	nume									
Duratio	n		Other prerequisites							
Duration Module level Other prerequisites 1 semester graduate Certain prerequisites must be met to qualify for adr sessment. The lecturer will inform students about t at the beginning of the course. Registration for the sidered a declaration of will to seek admission to a dents have obtained the qualification for admission the course of the semester, the lecturer will put the sessment into effect. Students who meet all prereq ted to assessment in the current or in the subseque sessment at a later date, students will have to obtain the course of the semester.			alify for admission to nts about the respec- ion for the course wi ission 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 Plasma getic pa acceler galaxie	ts Astrop articles ation v s and c	hysics: Dynamics of ch . Properties of magneti ia shock waves and via other cosmic objects.	narged particles in elec c turbulence. Propagat interaction with plasm	tric and magnetic fie ion of solar particles na turbulence. Particl	lds. Transport equat within the solar win le acceleration and t	ions for ener- d. Particle ransport in				
Intende	ed lear	ning outcomes								
The stu motion compar	dents l and ac re and c	nave basic knowledge of the second seco	of Plasma Astrophysics particles in space, they periments.	. They have mastere know corresponding	d the theoretical des g measuring method	scription of s and can				
Course	S (type, n	umber of weekly contact hour	5, 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, 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 p	olaces								
Additional information										
Workload										
Teaching cycle										
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data rece	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Physi	chelor's with 1 major Physics (2010) JMU Würzburg • generated 26-Aug-2024 • exam. page 172 / 250 reg. data record Bachelor (180 ECTS) Physik - 2010					

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) 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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 173 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation						
Introdu	Introduction to Space Physics 11-ASP-092-m01					
Module coordinator Modul				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 semestergraduateCertain prerequisites must be met to qualify for admission sessment. The lecturer will inform students about the res at the beginning of the course. Registration for the cours sidered a declaration of will to seek admission to assess dents have obtained the qualification for admission to a the course of the semester, the lecturer will put their register sessment into effect. Students who meet all prerequisite ted to assessment at a later date, students will have to obtain the admission to accessment anow			alify for admission to nts about the respec- ion for the course wi hission to assessmen or admission to asses will put their registra at all prerequisites wi e subsequent semes ave to obtain the qu	o as- ctive details Il be con- nt. If stu- ssment over ation for as- till be admit- ster. For as- alification for		
Conten	ts					
 Overview Dynamics of charged particles in magnetic and electric fields Elements of space physics The sun and heliosphere Acceleration and transport of energetic particles in the heliosphere 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						
Course	S (type, r	umber of weekly contact hou	rs, language — if other than Ge	rman)		
R + V (n	o infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	ot 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						
Bachelor's	with 1 ma	or Physics (2010)	JMU Würzbu reg. data rec	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 174 / 250

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) 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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 175 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Atmosphere and Space Physics					11-AWP-092-m01	
Module coordinator Module offere				Module offered by	_{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 Certain prerequisites must be met to qualify for admi sessment. The lecturer will inform students about the at the beginning of the course. Registration for the co sidered a declaration of will to seek admission to ass dents have obtained the qualification for admission to the course of the semester, the lecturer will put their sessment into effect. Students who meet all prerequi ted to assessment in the current or in the subsequen sessment at a later date, students will have to obtain admission to assessment a part.		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- ctive details ill be con- nt. If stu- ssment over ation for as- ill be admit- ster. For as- alification for			
Content	ts					
Structur tary ma exoplar	re of pl gnetos nets.	anetary atmospheres. In pheres and interplaneta	nteraction of planetary ary medium. (Micro) m	/ atmospheres with t eteorites, asteroids,	he Sun. Physics of c planetary rings. Atn	louds. Plane- nospheres of
Intende	ed learr	ning outcomes				
The stur and nea ry space	dents ł ar-Eartł e missi	nave knowledge of the p n space. They are able to ons.	hysics of planetary at apply the acquired k	mospheres, especia nowledge to the solu	lly of the atmospher ution of problems of	e of the Earth interplaneta-
Courses	S (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 avail	able)	
Method module is	l of ass creditab	sessment (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	t every semester, informat	ion on whether
a) writte groups or d) pro Assessi and will examin Langua	en exar (appro esenta ment o l be an ation ro ge of a	mination (approx. 90 mi x. 30 minutes per candi tion/seminar presentati ffered: When and how o nounced in due form un egulations) 2009. ssessment: German or B	nutes) or b) oral exam date) or c) project rep on (approx. 30 minute ften assessment will l der observance of Sec English	ination of one candi ort (approx. 8 pages, es) oe offered depends o ction 32 Subsection ;	date each or oral ex , time to complete: 1 on the method of as 3 ASPO (general aca	amination in to 4 weeks) sessment demic and
Allocati	ion of p	olaces				
Additional information						
Workload						
Peferred to in LPO L (even institutions factors birs down and an analysis)						
L						
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 176 / 250

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 177 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

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 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 registrat sessment into effect. Students who meet all prerequisites wi ted to assessment in the current or in the subsequent semest sessment at a later date, students will have 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			
Content	ts					
Group t	heory.	Finite groups. Lie grou	ps. Lie algebra. Depicti	on. Tensors. Classifi	cation theorem. App	lications.
Intende	d learn	ning outcomes				
The stu group tl lation a	dents l neory a nd pro	know the basics of grou and to solve them by us cessing of physical pro	up theory, especially of sing the acquired meth oblems.	Lie groups. They are ods. They are	able to identify prol apply group theory	blems of to the formu-
Courses	5 (type, n	umber of weekly contact hour	s, language — if other than Ge	rman)		
R + V (n	o infor	mation on SWS (weekl	y contact hours) and co	ourse language availa	able)	
Method module is	l of ass creditab	e essment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	t every semester, informati	ion on whether
a) writte groups project (approx Assessi and will examin Langua	en exar (appro report 30 m ment o l be an ation re ge of a	nination (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 See 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	on 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				
Bachelor's v	vith 1 maj	or Physics (2010)	JMU Würzbu reg. data rec	rrg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 178 / 250



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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 179 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	1

Module	Module title Abbreviation					
Numeri	Numerical Methods in Astrophysics 11-NMA-092-m01					
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Theoretical Physics and Astrophysics			heoretical 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 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 to a subsequent the subsequent the subsequent the semester.				
Conten	ts					
Various rithms Lattice- ENO). M CL).	s metho (tree- a Boltzm Aethod	ods used in astrophysica nd polynomial codes). F ann). Hyperbolic conse s of high-performance c	al simulations with sp Particle-mesh methods vation laws (fluid dyn omputing. Message-p	ecial emphasis on th s (particle-in-cell met amics, finite differer assing interface (MP	eir applications. N-k thods). Vlasow meth nce method, Rieman I). GPGPU programm	body algo- nods (e.g., n solver, ning (Open-
Intende	ed leari	ning outcomes				
The stu sics wit proach	dents a h the h: such p	are able to solve typical elp of numerical simula roblems and of validation	problems and equatic tions. They are especi ng the results.	ons of Astrophysics a ially capable of choo	nd other subdiscipl sing adequate strate	ines of Phy- egies to ap-
Course	S (type, n	umber of weekly contact hours,	language — if other than Ger	rman)		
V + Ü (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
Methoo module is	d of ass creditab	e ssment (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. Language of assessment: German, English						
Allocat	ion of p	olaces	_			
Additional information						
Workload						
Teaching cycle						
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 180 / 250
Referred to in LPO I (examination regulations for teaching-degree programmes)

Module appears in

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

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 181 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Quantum Field Theory II					11-QFT2-092-m01	
Module	Module coordinator			Module offered by		
Managing Director of the Institute of Tl and Astrophysics		Theoretical Physics	eoretical Physics Faculty of Physics and Astronomy			
ECTS	Metho	od of grading	Only after succ. compl. 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 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 at a later date, students will have to obtain the qualification for admission to assessment at a later date.) 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 5. Spor	theory II. Generating f itaneous symmetry bre	unctionals. Path integra aking. Effective field th	al. Renormalisation. eory (optional).	Renormalisation gro	up. Gauge
Intende	d learr	ning outcomes				
The stur red the problen	dents ł princip 1s of q	nave advanced knowle ples, especially of reno uantum field theory by	dge of the methods and rmalisation and gauge using the acquired cal	d concepts of quantu theories. They are ab culation methods.	Im field theory. They Dle to formulate and	have maste- solve simple
Courses	5 (type, n	umber of weekly contact hour	s, language — if other than Ger	man)		
R + V (n	o infor	mation on SWS (weekl	y 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, 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	on of p	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's v	vith 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 • ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 182 / 250

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 183 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation		
Renormalization Theory				11-RNT-092-m01	
Module	e coord	inator		Module offered by	
Managi and Ast	ng Dire trophys	ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	ind 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	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	s must be met to qua rer will inform stude the course. Registrat n of will to seek adm the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew.	alify for admission to as- nts about the respective details ion for the course will be con- hission to assessment. If stu- or admission to assessment over will put their registration for as- the all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for
Conten	ts	<u> </u>			
Renorm behavio levance ons. Sto berg-Ma and cor	nalisati our for e for ph ochast a differ mparis	on group methods for Ha dynamics beyond the eq lase diagrams in cryogen ic non-linear partial differ rential equations. Symme on of different RG methoo	miltonian systems. P uilibrium. Classical-c ic temperatures. Insta rential equations. Con etries, e.g. in the stoc ds.	artial non-linear diff ritical and quantum- ability of statistical a nstruction of generat hastic Burgers' equa	erential equations with scaling critical phenomena and their re- and dynamic mean-field soluti- ting functionals. Halperin-Hohen- ation (KPZ equation). Introduction
Intende	ed lear	ning outcomes			
The stu tions. T tasks.	dents l hey kn	have gained an overview ow important examples a	of renormalisation gr and corresponding so	oup methods for not lving methods and a	n-linear partial differential equa- are able to apply them to specific
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
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, 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.					
Allocation of places					
Additio	nal inf	ormation			
Worklo	ad				

Teaching cycle

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

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Module appears in

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Module title			Abbreviation			
Relativi	Relativistical Quantumfield Theory 11-RC					
Module	coord	inator		Module offered by		
Managi	ng Dire	ector of the Institute of	Theoretical Physics	Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
8	nume	rical grade		<u></u>		
Duratio	n	Module level	Other prerequisites			
1 seme:	stergraduateCertain prerequisitesstergraduateCertain 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 co sidered a declaration of will to seek admission to assessment. If stu 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 ad ted to assessment in the current or in the subsequent semester. For 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					
Symme theory. normali	tries. L Feynm isation	agrange formalism for an rules. Quantum elec	fields. Field quantisatio trodynamic processes	on. Gauge principle a in Born approximati	and interaction. Pert on. Radiative correct	urbation tions and re-
Intende	ed learı	ning outcomes				
The stu They kn process standin	dents l low hou ses in t lg of ra	nave mastered the prin w to use perturbation the framework of quant diative corrections and	ciples and underlying r neory and how to apply um electrodynamics in renormalisation.	mathematics of relat / Feynman rules. The leading order. More	ivistic quantum field y are able to calcula over, they have a ba	l theories. te basics sic under-
Courses	S (type, n	umber 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 availa	able)	
Methoo module is	of ass	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) 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						
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu	rg • generated 26-Aug-2024	• exam.	page 186 / 250
			reg. data rec	ord Bachelor (180 ECTS) Phys	ik - 2010	

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Module appears in

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Module title			Abbreviation			
Theory of Relativity				11-RTT-092-m01		
Module	coord	inator		Module offered by		
Managi and Ast	Managing Director of the Institute of Tl and Astrophysics		Theoretical Physics	eoretical Physics Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. compl. 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 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 ove 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 f			as- tive details ll be con- nt. If stu- sment over tion for as- ill be admit- ster. For as- alification for
Conten	ts		1			
Mathen ments o general	natical of diffe 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	tivity; 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 knowledgo	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	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	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 iutes) or c) esentation sessment demic and		
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)						
bachelor's v	with 1 maj	UI PRYSICS (2010)	JMU Wurzbu reg. data reco	rg • generated 26-Aug-2024 (ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 188 / 250



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	reg. data record Bachelor (180 ECTS) Physik - 2010	

Bachelor's with 1 major Physics (2010)

Module title				Abbreviation	
Theore	tical El	ementary Particle Physic	CS		11-TEP-092-m01
Module	Module coordinator			Module offered by	
Managi and Ast	Managing Director of the Institute of Theoretical Physics 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 semester 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 registration sessment into effect. Students who meet all prerequisites wited to assessment in the current or in the subsequent semesters at a later date, students will have to obtain the qualification to assessment at a later date, students will have to obtain the qualification to assess the course of the semester of the subsequent semesters are sessment at a later date, students will have to obtain the qualification to assess the course of the semester of the subsequent semesters are sessment at a later date, students will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the semesters will have to obtain the qualification to assess the course of the se		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				
Fundan Gauge tension	nental theorie is of th	forces and particles. Gro s. Spontaneous symmet e standard model.	ups and symmetries. ry breaking. Electrow	Quark model. Princi eak standard model.	ples of quantum field theory. Quantum chrome dynamics. Ex-
Intende	ed lear	ning outcomes			
The stu structu lation r re, they	dents a re of th nethod v know	are familiar with the mat e standard model based s for the processing of s the tests and limits of th	hematical methods of on symmetry princip imple problems and p e standard model and	f Elementary Particle les and experimenta processes of Element d the basics of exten	Physics. They understand the l observations. They know calcu- tary Particle Physics. Furthermo- ded theories.
Course	S (type, r	number of weekly contact hours,	language — if other than Ger	rman)	
R + V (n	no 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, 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.					
Allocation of places					
Additional information					
Worklo	ad				
Teachi	Teaching cycle				

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

Module appears in

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	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title					Abbreviation	
Experimental 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 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					
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.	ors at the LHC and at the eyond the standard mod andard model. Introduc	e Tevatron. Discoven del. Determination o ction to modern meth	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 ns of P d are a	are familiar with the pr Particle Physics, which able to put results into	inciples 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-
Course	5 (type, n	umber of weekly contact hou	rs, language — if other than Ge	rman)		
R + V (n	o infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)	
Methoo module is	l of ass creditab	sessment (type, scope, lang le for bonus)	guage — 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		
Allocat	ion of p	olaces	<u> </u>			
Additional information						
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data rec	rrg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 192 / 250



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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 193 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	1 0 997 9

Module title			Abbreviation			
Particle Physics (Standard Model)				11-TPS-092-m01		
Module coordinator				Module offered by		
Managing Directors of the Institute of Applied the Institute of Theoretical Physics and Astrop			Applied Physics and Astrophysics	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 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	s must be met to qua rer will inform stude the course. Registrat n of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in the date, students will has sment anew.	alify for admission to nts about the respec- ion for the course wi ission to assessmen r admission to asses will put their registra t all prerequisites wi e subsequent semes ave to obtain the qu) as- tive details Il be con- nt. If stu- ssment over tion for as- till be admit- ster. For as- alification for	
Content	ts					
Introdu standar	ction to d mod	o the theory of electrow el and determination o	eak interaction and sp f model parameters.	ontaneous symmetry	y breaking. Experime	ents on the
Intende	d learr	ning outcomes				
The stue perimer theoreti	dents nts tha ical res	know the theoretical fur t have established and sults in the framework o	ndamental laws of the confirmed the standar of the standar of the standard model a	standard model of P d model. They are al and know its validity	article Physics and t ble to interpret expen and limits.	he key ex- rimental or
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	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 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)						
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 194 / 250



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Bachelor's with 1 major Physics (2010)

Module	title				Abbreviation
Supers	ymmet	ry I and II			11-SUS-092-m01
Module	e 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. 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				
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 etric standard mode 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 lear	ning outcomes			
The stu tric moo importa	dents l dels. Tl 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
Course	S (type, r	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)
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) 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 a	places			
Additional information					
Worklo	ad				
Teaching cycle					

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

Module appears in

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Module title				Abbreviation	
Theore	tical As	strophysics			11-AST-092-m01
Module	e coord	inator		Module offered by	
Managing Director of the Institute of Th and Astrophysics			eoretical Physics	Faculty of Physics a	nd Astronomy
ECTS Method of grading		Only after succ. com	npl. of module(s)		
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	Contents				
Theoret	tical As	trophysics, models for th	e description of com	plex observation res	ults, numeric simulations.
Intende	ed leari	ning outcomes			
The stu observa	dents l ations a	nave 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, n	umber 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 avail	able)
Method module is	d of ass	e ssment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether
Allocat			les)		
Allocal		Jaces			
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	ars in			
Bachel	or' deg	ree (1 major) Physics (20:	10)		
Bachel	or' deg	ree (1 major) Physics (201	12)		
Bachel	or' deg	ree (1 major) Mathematic	al Physics (2009)		
Bachel	or deg	ree (1 major) Mathematic	al Physics (2012)		
Master	Master's degree (1 Major) Physics (2010) Master's degree (4 major) Physics (2014)				
Master	Master's degree (1 major) Mathematical Physics (2012)				
Master	's degr	ee (1 major) FOKUS Physi	cs (2010)		
Master	's degr	ee (1 major) FOKUS Physi	cs (2011)		
Master	's degr	ee (1 major) FOKUS Physi	cs (2006)		

Module	e title				Abbreviation	
Strong	Strong Interaction in Accelerator Experiments				11-WWB-102-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of	Applied Physics	blied Physics Faculty of Physics and Astronomy		
ECTS Method of grading		Only after succ. con	npl. of module(s)			
3	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.			
Conten	ts					
Asympt mena. collisio	tomatio QCD Je ns.	: freedom/confinemen t simulation. Hadron p	t. Hadron production in roduction in electron-pr	e+/e- collisions. QC oton collisions. Had	D coherence/interfe ron production in pr	erence pheno- roton-proton
Intende	ed lear	ning outcomes				
The stu perime to appl	dents nts. Th y them	know the basic organis ey have knowledge of	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	rs, language — if other than Ger	rman)		
V + R (r	no infor	mation on SWS (week	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, o	examination offered — if no	t every semester, informat	ion on whether
a) writt groups project (approz 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.				amination in nutes) or c) esentation sessment demic and	
Allocat	ion of _l	olaces				
Additio	onal inf	ormation				
Worklo	Workload					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 199 / 250



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)

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Module title			Abbreviation			
Practica	Practical Course Astrophysics				11-APP-111-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of T and Astrophysics			Theoretical 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 prerequisite sessment. The lectu at the beginning of f 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	s must be met to qua irer will inform stude the course. Registrat on of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew.	alify for admission to nts about the respec- ion for the course wi hission to assessment r admission to asses will put their registra t all prerequisites w e subsequent semest ave to obtain the qu) as- tive details Il be con- nt. If stu- ssment over tion for as- till be admit- ster. For as- alification for	
Conten	ts					
Astroph tions.	nysical	experiments in the fiel	ds of detectors, telesco	opes, methodology, a	analysis and astronc	mic observa-
Intende	ed learı	ning outcomes				
The stu measur and wit ons and	dents l ring dat h basio d meas	nave mastered experim ta and present the resu c techniques of detection urements and to prese	ental methods of Astro Its. They are familiar w ng electromagnetic rad nt the results.	ophysics and are able ith the working meth iation. They are able	e to analyse and inte ods of observationa to plan and evaluat	rpret the l Astronomy e observati-
Course	S (type, n	umber of weekly contact hours	s, language — if other than Ge	rman)		
P (no in	format	ion on SWS (weekly co	ntact hours) and cours	e language available	2)	
Methoo 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, informat	on 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 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				if a Testat scussion to oprox. 20 mi- sessment demic and		
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data rec	rrg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 201 / 250



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Module title				Abbreviation		
Particle	Particle Radiation Detectors					
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)		
4 numerical grade						
Duratio	on	Module level	Other prerequisites	i		
1 semester graduate		graduate	Certain prerequisite sessment. The lectu 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 asses	is must be met to qua irer will inform stude the course. Registrat on of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew.	alify for admission to nts about the respec- ion for the course wi hission to assessment r admission to asses will put their registra t all prerequisites w e subsequent semest ave to obtain the qu	o as- ctive details ctil be con- nt. If stu- ssment over ation for as- til be admit- ster. For as- alification for
Conten	ts					
Princip minatio	les of in on of m	nteraction between pa omentum, energy and	rticles and matter. Parti particle identification.	icle detectors for spa Conception of partic	ce and time measur e detectors in exam	ement, deter- ples.
Intende	ed learı	ning outcomes				
The stu and ap basic k	idents l plicatic nowlec	know the physical prin ons of different types o lge of the conception c	ciples and the basic str f detectors, they can ex if detector systems.	ructure of particle de plain the measurem	tectors. They know t ent of physical value	he functions es and have
Course	S (type, n	number of weekly contact hour	s, language — if other than Ge	rman)		
V + Ü (r	no infor	mation on SWS (week	y contact hours) and co	ourse language avail	able)	
Method module is	d of ass creditab	essment (type, scope, lang le for bonus)	guage — 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	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				
Additio	nal inf	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	e appea	ars in				
Bachelor's	with 1 maj	jor Physics (2010)	JMU Würzbu reg. data rec	ırg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 203 / 250



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Module title Abbrev				Abbreviation		
Genera	l Theor	y of Relativity			11-ART-112-m01	
Module	Module coordinator			Module offered by		
Managi and Ast	ng Dire rophys	ector of the Institute of sics	Theoretical Physics	eoretical Physics Faculty of Physics 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 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					
Mathen ments o general	natical of diffe relativ	foundations of the the rential geometry; electr 'ity; stellar models; intr	ory of relativity; differen odynamics as an exam oduction to cosmology	ntial forms; brief sun ple of a relativistic g ; Hamiltonian formu	nmary of special rela gauge theory; field ea lation	ativity; ele- quations of
Intende	ed learr	ning outcomes				
The stur mathen able to	dents a natical apply t	are familiar with the bas understanding of the fo the acquired knowledge	sic physical and mathe ormulation of general r e to problems of Astrop	matical concepts of elativity on the basis hysics and cosmolo	general relativity. Th s of differential form: gy.	iey have a s. They are
Courses	5 (type, n	umber of weekly contact hours	s, language — if other than Ger	man)		
V + R (n	o infor	mation on SWS (weekly	/ contact hours) and co	urse language availa	able)	
Method module is	l of ass creditab	essment (type, scope, lang le for bonus)	uage — if other than German, e	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				
 Additional information						
Workload						
Teaching cycle						
Kererre	מ נס וח	LFUI (examination regulation	ons for teaching-degree progra	mmes)		
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 205 / 250



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)

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	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation		
Special Theory of Relativity				11-SRT-112-m01		
Module coordinator				Module offered by		
Managing Director of the Institute of Th and Astrophysics		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 semester 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 for			
Conten	ts					
Mathen nian eq	natical uation	principles; differential of motion; relativistic	forms; special relativit free particle	y; Minkowski space;	Lorentz transformat	ion, Hamilto-
Intende	d learr	ning outcomes				
The stu familiar ge to pr	dents a with n oblem	are familiar with the ph nodern mathematical f s of special relativity.d	ysical concepts and ma ormulation of special re en.	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 hour	s, language — if other than Ge	rman)		
V + R (n	o infor	mation on SWS (weekl	y 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) writte groups project (approx Assessi and will examin	en exar (appro report 3. 30 m ment o l be an ation re	nination (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.	inutes) or b) oral exam lidate, 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 pe 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				
Worklo	ad					
Teaching cycle						
KETEFIED TO IN LFU I (examination regulations for teaching-degree programmes)						
mouule	ahheg	113 III				
Bachelor's v	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reci	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 207 / 250



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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 208 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation		
Current Topics in Experimental Physics 11-BXE5-112-m01			11-BXE5-112-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)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or study	topics / abroa	of Experimental Physics. Id.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	d learr	ning outcomes			
The stur sics of t underst classify	dents ł he Bac and th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and s knowledge. They are able to
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	ourse 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 in group weeks) Langua	en exar os (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Workloa	ad				
Teachin	ıg cycl	9			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	in and the second se			
Bachelo	or' deg	ree (1 major) Physics (20:	10)		
Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 209 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation		
Current Topics in Experimental Physics					11-BXE6-112-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)	
6	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Approval by examination	ation committee req	uired.
Content	ts				
Current study a	topics broad.	in Experimental Physics.	Credited academic a	chievements, e.g. in	case of change of university or
Intende	d learr	ning outcomes			
The stur sics of t underst classify	dents h he Bac and th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli ssary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and s knowledge. They are able to
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 in group weeks) Langua	en exar os (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Workloa	ad				
Teachin	ig cycle	9			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	in			
Bachelo	or' degi	ree (1 major) Physics (20:	10)		
Bachelo	or' degi	ree (1 major) Physics (20:	12)		

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 210 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation	
Current Topics in Experimental Physics				11-BXE8-112-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 semes	ster	undergraduate	Approval by examination	ation committee req	uired.
Content	ts				
Current study a	topics broad.	in Experimental Physics.	Credited academic a	achievements, e.g. in	case of change of university or
Intende	d learr	ning outcomes			
The stur sics of t underst classify	dents l he Bac and th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli assary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and knowledge. They are able to
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 in group weeks) Langua	en exar os (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Workloa	ad				
Teachin	ıg cycl	9			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	irs in			
Bachelo	or' deg	ree (1 major) Physics (20:	lo)		
Bachelo	or' deg	ree (1 major) Physics (20:	12)		

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 211 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title				Abbreviation	
Current	Topics	s in Theoretical Physics			11-BXT5-112-m01
Module coordinator				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)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current study a	topics broad.	in Theoretical Physics. C	redited academic ach	nievements, e.g. in c	ase of change of university or
Intende	ed leari	ning outcomes			
The stu sics of t Physics blems o	dents l the Bac and h of Theo	have advanced competer chelor's programme. They ave mastered the require retical Physics.	icies corresponding t v have advanced spea d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-
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	urse language availa	able)
Methoo 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 grou weeks) Langua	en exaı ps (app or d) p ge of a	mination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
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	appea	ars in			
Bachelo	or' deg	ree (1 major) Physics (202	10)		
Bachelo	Bachelor' degree (1 major) Physics (2012)				

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 212 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	title				Abbreviation
Current Topics in Theoretical Physics 11-BXT6-112-mo1			11-BXT6-112-m01		
Module coordinator				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	undergraduate			
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	d learr	ning outcomes			
The students have advanced competencies corresponding to the requirements of a module of Theoretical Phy- sics of the Bachelor's programme. They have advanced specialist knowledge of a subdiscipline of Theoretical Physics and have mastered the required methods. They are able to apply the acquired methods to current pro- blems of Theoretical Physics.				of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-	
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) 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) Language of assessment: German or English					
Allocation of places					
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appea	in in			
Bachelo	Bachelor' degree (1 major) Physics (2010)				
Bachelo	or' deg	ree (1 major) Physics (201	12)		

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 213 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	title				Abbreviation	
Current Topics in Theoretical Physics 11-BXT8-112-m01			11-BXT8-112-m01			
Module coordinator				Module offered by		
chairpe	rson of	f examination committee		Faculty of Physics a	nd Astronomy	
ECTS	Metho	od of grading	Only after succ. com	ompl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate	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 students have advanced competencies corresponding to the requirements of a module of Theoretical Phy- sics of the Bachelor's programme. They have advanced specialist knowledge of a subdiscipline of Theoretical Physics and have mastered the required methods. They are able to apply the acquired methods to current pro- blems of Theoretical Physics.				of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-		
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) 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) Language of assessment: German or English						
Allocation of places						
Additio	nal info	ormation				
Worklo	ad					
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module	appea	in and the second se				
Bachelo	Bachelor' degree (1 major) Physics (2010)					
Bachelo	or' degi	ree (1 major) Physics (201	12)			

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 214 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	e title				Abbreviation	
Particle Radiation Detectors			11-DTS-131-m01			
Module coordinator				Module offered by		
Manag	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)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites	ther prerequisites		
1 seme	ster	graduate	Certain prerequisite sessment. The lectu at the beginning of t sidered a declaratio dents have obtained the course of the set sessment into effect ted to assessment in	s must be met to qua rer will inform stude the course. Registrat n of will to seek adm the qualification fo mester, the lecturer t. Students who mee n the current or in the	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 semesters.	
Conten	Its					
Princip minatio	les of in on of m	nteraction between partion omentum, energy and pa	cles and matter. Parti rticle identification. (cle detectors for spa Conception of particl	ce and time measurement, deter- e detectors in examples.	
Intend	ed lear	ning outcomes				
The stu and ap basic k	idents l plicatio nowleo	know the physical princip ons of different types of d Ige of the conception of c	oles and the basic str etectors, they can ex letector systems.	ucture of particle det plain the measurem	tectors. They know the functions ent of physical values and have	
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)		
V + Ü (r	no infoi	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
Methoe module is	d of ass s 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) 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	onal inf	ormation				
Workload						
Teaching cycle						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Module	e appea	irs in	<u>```</u>			
Bachel	Bachelor' degree (1 major) Physics (2010)					
Dachel	bachelor degree (1 major) r mysics (2012)					

Bachelor's with 1 major Physics (2010)



Complex Systems, Quantum control and Biophysics

(ECTS credits)

Abbr.: KB. Modules for advanced Bachelor's students offered by the Faculty with regard to preparation for Bachelor's thesis and specialisation in Master's programme.

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 216 / 250				
	reg. data record Bachelor (180 ECTS) Physik - 2010					
Module title					Abbreviation	
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Nano-Optics					11-NOP-092-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Ap		pplied 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					
Theoret quantu	tical pri m emit	inciples. Focussing of lig ters. Light emission in r	ght. Microscopy. Optic ano-tailored environn	al nearfield probes. 1ents. Plasmons. Op	Nearfield microscop tical antennas.	y. Single
Intende	ed learr	ning outcomes				
The students have specific and advanced knowledge in the field of nano-optics. They are familiar with the theo- retical principles and application areas of nano-optics and with current developments in this field.						
R + V (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)					
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 1utes) or c) esentation sessment demic and	
Allocati	ion of p	olaces	<u> </u>			
Additio	nal info	ormation				
Worklo	ad					
Teaching cycle						
Referre	d to in	LPO I (examination regulatio	ns for teaching-degree progra	immes)		
 Madul-	-	arc in				
Bachel	appea	ree (1 major) Physics (2)	210)			
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu reg. data reg	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Physi	• exam. ik - 2010	page 217 / 250

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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 218 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation			
Biophysical Measurement Technology in Medical Science				11-BMT-092-m01		
Module coordinator				Module offered by		
Managing Director of the Institute of Ap		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 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 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					
The lecture covers the physical principles of imaging techniques and their application in Biomedicine. The main topics are conventional X-ray technique, computer tomography, imaging techniques of nuclear medicine, ultrasound and MR-tomography. The lecture additionally addresses systems theory of imaging systems and digital image processing. Intended learning outcomes The students know the physical principles of imaging techniques and their application in Biomedicine. They un-						
images Course	s (type r	umber of weekly contact hou	rs language — if other than Ge	rman)	· · ·	
R + V (r	o infor	mation on SWS (week	v contact hours) and co	ourse language avail	ahle)	
Method module is	d of ass	Sessment (type, scope, lan;	guage — 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				
Additio	nal inf	ormation				
Workload						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data rec	ırg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 219 / 250

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 degree (1 major) FOKUS Physics (2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 220 / 250
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Module title				Abbreviation		
Laboratory and Measurement Technology in Biophysics				11-LMB-092-m01		
Module coordinator				Module offered by		
Manag	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	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 apow				
Conten	ts					
The lec physica measu methoo	ture co al proce ring tec ls 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.	Ilar 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	
Intende	ed learı	ning outcomes				
The stu sical pr measu biomol	dents l ocedur ring tec ecules.	know the principles of mo res for the examination a hniques and their applic	blecular and cellular b nd manipulation of bi ations and are able to	biology as well as the iological systems. Th b apply techniques c	e physical principles of biophy- ney have knowledge of optical of structure elucidation to simple	
Courses (type, number of weekly contact hours, language — if other than German)						
R + V (r	io infor	mation on SWS (weekly o	contact hours) and co	urse 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.						
Allocat	ion of p	olaces				
Additional information						
Worklo	ad					
Teachi	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 (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 222 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title			Abbreviation		
Physics of Complex Systems				11-PKS-092-m01	
Module coordinator			Module offered by		
Managing Dire and Astrophys	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				
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.			
Contents					
 Iheory of cr Introduction Entropy pro Phase trans Universality Spin glasse Theory of ne 	itical phenomena in theri n into the physics out of e duction and fluctuations sitions away from equilibr rt est eural networks	mal equilibriumt equilibriumt t riumt			
Intended lear	Intended learning outcomes				
The students I methods of St such systems.	have specific and advance atistical Physics, Compu . They are able to work or	ed knowledge in the tational Physics and n current research pro	field of physics of co non-linear dynamics oblems in this area.	omplex systems. They know the , which are used to describe	
Courses (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
R + V (no infor	mation on SWS (weekly o	contact hours) and co	ourse language availa	able)	
Method of ass module is 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. Language of assessment: German. English					
Allocation of	Allocation of places				
		·			
Additional inf	ormation				
Workload	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 (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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 224 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Bachelor's with 1 major Physics (2010)

Module title				Abbreviation	
Quantum Information and Quantum Computing				11-QIC-092-m01	
Module coordinator				Module offered by	
Manag and As	ing Dire	ector of the Institute of T sics	heoretical Physics	Faculty of Physics a	nd Astronomy
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)	
5	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				
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 top es. The third part covers	al concepts of quantur e second part discuss bics is the production, the description and e	m information and quest experimental post controlling and man xplanation of decohe	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 e able	nave an advanced unde to solve simple problem	rstanding of quantum is of quantum informa	theory and basic kno tion theory.	owledge of quantum calculation.
Course	S (type, r	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 avail	able)
Metho module is	d of ass creditab	essment (type, scope, langu le for bonus)	age — 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	<u></u>		
Additional information					
Worklo	ad				
Teachi	Teaching cycle				

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

Module appears in

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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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 226 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title					Abbreviation	
Statistics, Data Analysis and Computer Physics 11-SDC-092-m01						
Modul	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)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate Certain prerequisites must be sessment. The lecturer will in at the beginning of the cours sidered a declaration of will t dents have obtained the qua the course of the semester, t sessment into effect. Studen ted to assessment in the curr sessment at a later date, stud admission to assessment an		s must be met to qua rer will inform stude the course. Registrat n of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h sment anew.	alify for admission to nts about the respec- ion for the course wi ission 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		
Conter	nts					
Statist	ics, dat	a analysis and comput	er physics.			
Intend	ed lear	ning outcomes				
The stu Physic	udents s.	have specific and adva	nced knowledge in the	field of statistics, da	ita analysis and Com	nputational
Course	S (type, r	number of weekly contact hour	rs, language — if other than Ger	rman)		
R + V (1	no infor	mation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Metho module i	d of ass s creditab	sessment (type, scope, lang le for bonus)	guage — if other than German, o	examination offered — if no	t every semester, informat	ion on whether
a) writh groups project (appro Assess and wi examir Langua	en exa (appro t report x. 30 m ment o Il be an nation 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 didate, for modules with , time to complete: 1 to often assessment will k under observance of Sec nglish	ination of one candi n less than 4 ECTS cr 4 weeks) or d) prese pe 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	tion of _l	olaces				
Additio	onal inf	ormation				
Worklo	bad					
 		_				
Teachi	ng cycl	e				
 Def:				`		
Referre	ea to in	LTUI (examination regulation	ions for teaching-degree progra	immes)		
Bachol	e appea	IIS IN	2010)			
Bachel	or' deg	ree (1 major) Physics (2	2010) 2012)			
Bachelor's	with 1 ma	or Physics (2010)	JMU Würzbu reg. data reco	rg • generated 26-Aug-2024 ord Bachelor (180 ECTS) Phys	• exam. ik - 2010	page 227 / 250

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

UNIVERSITÄT

WÜRZBURG

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 228 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	title				Abbreviation
Current	Current Topics in Experimental Physics 11-BXE5-112-mo1				11-BXE5-112-m01
Module	Module coordinator 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)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current or study	topics / abroa	of Experimental Physics. Id.	Accredited academi	c achievements, e.g.	in case of change of university
Intende	d learr	ning outcomes			
The stur sics of t underst classify	dents ł he Bac and th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and s knowledge. They are able to
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	ourse 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 in group weeks) Langua	en exar os (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Workloa	ad				
Teachin	Teaching cycle				
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	in and the second se			
Bachelo	or' deg	ree (1 major) Physics (20:	10)		
Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 229 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation					
Current	Topics	s in Experimental Physics	5		11-BXE6-112-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 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current study a	topics broad.	in Experimental Physics.	Credited academic a	achievements, e.g. ir	a case of change of university or
Intende	ed lear	ning outcomes			
The stu sics of t underst classify	dents l the Bac tand th r the su	have advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements of a current subdiscipli essary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and 5 knowledge. They are able to
Course	S (type, r	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	urse language availa	able)
Methoo 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 grou weeks) Langua	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)				
Allocation of places					
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)	
Module	appea	ars in			
Bachelo	or' deg	ree (1 major) Physics (20:	10)		
Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 230 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation					
Current	Current Topics in Experimental Physics 11-BXE8-112-mo1				
Module	Module coordinator 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 semes	ster	undergraduate	Approval by examination	ation committee req	uired.
Content	ts				
Current study a	topics broad.	in Experimental Physics.	Credited academic a	achievements, e.g. in	case of change of university or
Intende	d learr	ning outcomes			
The stur sics of t underst classify	dents l he Bac and th the su	nave advanced competer chelor's programme. They e measuring and/or eval bject-specific contexts a	ncies corresponding t / have knowledge of a uation methods nece nd know the applicat	o the requirements on a current subdiscipli assary to acquire this ion areas.	of a module of Experimental Phy- ne of Experimental Physics and knowledge. They are able to
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 in group weeks) Langua	en exar os (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Workloa	ad				
Teachin	ıg cycl	9			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	irs in			
Bachelo	or' deg	ree (1 major) Physics (20:	lo)		
Bachelor' degree (1 major) Physics (2012)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 231 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	title				Abbreviation
Current	Current Topics in Theoretical Physics 11-BXT5-112-m01			11-BXT5-112-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)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate	Approval by examination	ation committee req	uired.
Conten	ts				
Current study a	topics broad.	in Theoretical Physics. C	redited academic ach	nievements, e.g. in c	ase of change of university or
Intende	ed leari	ning outcomes			
The stu sics of t Physics blems o	dents l the Bac and h of Theo	have advanced competer chelor's programme. They ave mastered the require retical Physics.	icies corresponding t v have advanced spea d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-
Course	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	urse language availa	able)
Methoo 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. 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)					
Allocation of places					
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	appea	ars in			
Bachelo	or' deg	ree (1 major) Physics (202	10)		
Bachelor' degree (1 major) Physics (2012)					

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reg. data record Bachelor (180 ECTS) Physik - 2010	

Module	title				Abbreviation
Current	Current Topics in Theoretical Physics 11-BXT6-112-m01				11-BXT6-112-m01
Module coordinator 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	undergraduate			
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 Physics blems c	dents l the Bac and h of Theo	nave advanced competer chelor's programme. They ave mastered the require retical Physics.	ncies corresponding t / have advanced spec d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-
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)
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
a) writte in group weeks) Langua	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)				
Allocati	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Teaching cycle					
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	ars in			
Bachelo	or' deg	ree (1 major) Physics (201	10)		
Bachelo	or' deg	ree (1 major) Physics (201	12)		

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 233 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation					Abbreviation
Current	Current Topics in Theoretical Physics 11-BXT8-112-mo1				
Module coordinator 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 semes	ster	undergraduate	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 Physics blems c	dents h the Bac and h of Theo	nave advanced competer chelor's programme. They ave mastered the require retical Physics.	icies corresponding t v have advanced spec d methods. They are	o the requirements of cialist knowledge of able to apply the acc	of a module of Theoretical Phy- a subdiscipline of Theoretical quired methods to current pro-
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 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 in group weeks) Langua	en exar os (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pre ssessment: German or Er	nutes) or b) oral exan lidate) or c) project re sentation (approx. 3c nglish	nination of one cand eport (approx. 8 to 10 o minutes)	idate each or oral examination pages, time to complete: 1 to 4
Allocati	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
Teachir	ng cycl	9			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module	appea	in and the second se			
Bachelo	or' deg	ree (1 major) Physics (201	10)		
Bachelo	Bachelor' degree (1 major) Physics (2012)				

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 234 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	



Thesis (10 ECTS credits)

The grade awarded for the thesis will count double in the calculation of the overall grade of the Bachelor's degree.

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 235 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abbreviation						
Bachelor Thesis Physics					11-BA-P-072-m01	
Module coordinator				Module offered by		
chairp	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	ester	undergraduate				
Conter	nts					
Mostly and sc	indepe ientific	ndent processing of an e aspects.	experimental or theor	etical task of Physics	s according to known procedures	
Intend	ed lear	ning outcomes				
The stu cording	udents a g to kno	are able to independently wn methods and scientif	/ work on an experim fic aspects and to wri	ental or theoretical t te the Bachelor's the	ask from Physics, especially ac- esis.	
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)		
no cou	rses as	signed				
Metho module i	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	
written Langua	thesis age of a	(approx. 25 pages) ssessment: German or Er	nglish			
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Modul	e appea	irs in				
Bachel	or' deg	ree (1 major) Physics (200	07)			
Bachel	or' deg	ree (1 major) Physics (20:	10)			
Bachel	or' deg	ree (1 major) Physics (200	09)			
Bachel	or' deg	ree (1 major) Physics (20:	12)			
васпе	Bachelor' degree (1 major) Physics (2008)					

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 236 / 250
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Module Catalogue for the Subject Physics Bachelor's with 1 major, 180 ECTS credits

Subject-specific Key Skills

(16 ECTS credits)

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Compulsory Courses

(10 ECTS credits)

Modules 11-P-MR and 11-HS must be successfully completed.

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	reg. data record Bachelor (180 ECTS) Physik - 2010	1

Module title Abbreviation					Abbreviation	
Advanced Seminar Experimental/Theoretical Physics 11-HS-092-m01					11-HS-092-m01	
Module coordinator				Module offered by		
Managi the Inst	ng Dire titute o	ectors of the Institute of A f Theoretical Physics and	Applied 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	undergraduate	Admission prerequis	site to assessment: ı of seminar presenta	regular attendance and suc- tion.	
Conten	ts					
Current	issues	of Theoretical/Experime	ntal Physics.			
Intende	ed leari	ning outcomes				
The stu to inde	dents l pender	nave advanced knowledg ntly acquire this knowled	ge of a specialist field ge and to summarise	of Experimental or T it in an oral present	Theoretical Physics. They are able ation.	
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	s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether	
talk (ap Assessi and wil examin	talk (approx. 30 to 45 minutes) with discussion Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2000					
Allocation of places						
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	e				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
Module	appea	irs in				
Bachelo	or' deg	ree (1 major) Physics (20	10)			
Bachelo	or' deg	ree (1 major) Physics (20	12)			
Bachel	or deg or's deg	ree (1 major) Mathematic gree (1 major, 1 minor) Ph	ai Physics (2009)			

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 239 / 250
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Module title Abbreviation						
Mathematical Methods of Physics 11-P-MR-092-m01						
Module coordinator				Module offered by		
Managing Director of the Institute of Theoretical Ph and Astrophysics			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	i		
2 seme	ster	undergraduate				
Conten	ts					
Principl duction on of ba other (c	les of n 1 to anc asic kn lelta di	nathematics and basic of I preparation of the mod owledge, functions of s stribution, Fourier trans	calculation methods b dules of Theoretical Ph everal real variables, o form).	eyond the school cu nysics and Classical d differential equations	rriculum, especially or Experimental Phys s, linear algebra, vec	for the intro- sics. Repetiti- tor analysis,
Intende	ed learn	ning outcomes				
The stu require especia	dents ł d in Th ally in t	nave knowledge of the p eoretical and Experimer he field of Physics.	orinciples of mathema ntal Physics. They are	tics and elementary able to apply these n	calculation methods nethods to simple pi	which are roblems,
Course	S (type, n	umber of weekly contact hours	, language — if other than Ge	rman)		
Mathen hour), c Mathen hour), c	natisch once a y natisch once a y	e Rechenmethoden 1 (N year (winter semester) e Rechenmethoden 2 (N year (summer semester)	Nathematical Method Mathematical Method	s 1): V (2 weekly cont s 2): V (2 weekly con	act hours) + Ü (1 wee tact hours) + Ü (1 we	ekly contact ekly contact
Method	l of ass	essment (type, scope, lang	 lage — if other than German.	examination offered — if no	t every semester, informati	ion on whether
module is	creditab	le for bonus)				
This mo 1. Topic 1)): e 2. Topic 2)): e Succes	odule h cs cove xercise cs cove exercise sful con	as the following assess red in lectures and exer is or talk (approx. 15 min red in lectures and exer es or talk (approx. 15 min mpletion of approx. 50%	ment components cises in part 1 (Mathe nutes, usually chosen cises in part 2 (Mathe nutes, usually chosen 6 of practice work eac	matische Rechenmet) or written examinat matische Rechenme) or written examinat h is a prerequisite fo	hoden 1 (Mathemati ion (approx. 60 mini thoden 2 (Mathemat ion (approx. 60 min r admission to asses	ical Methods utes) tical Methods utes) ssment com-
ponent: Studen	s 1 and ts mus [.]	2. t register for assessmer	t components 1 and 2	online (details to be	e announced).	
To pass	s this m	odule, students must p	ass both assessment	component 1 and as	sessment componer	nt 2.
Allocat	ion of p	olaces	_			
Additio	nal inf	ormation				
Worklo	ad					
Teachir	ng cycl	9				
			,			
Referre	d to in	LPOI (examination regulatio	ns for teaching-degree progra	ammes)		
§ 53 (1) § 77 (1)	1. a) Pl 1. a) Pl	nysik Mechanik, Wärme nysik "Grundlagen der E	lehre, Elektrizitätsleh xperimentalphysik"	re, Optik, der speziel	len Relativitätstheor	rie
Module	appea	rs in				
Bachelor's	with 1 maj	or Physics (2010)	JMU Würzbu	irg • generated 26-Aug-2024	• exam.	page 240 / 250



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 (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 241 / 250
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Physics

Compulsory Electives

(6 ECTS credits)

6 ECTS credits must be achieved in mandatory electives.

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 242 / 250
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Module title				Abbreviation		
Laboratory and Measurement Technology					11-A3-072-m01	
Module coordinator				Module offered by		
Managing Director of the Institute of Ap			Applied Physics	ied 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	i		
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 for admission to assessment anew.			
Conten	ts					
Introdu nics, cr	iction t yogeni	o electronic and optica cs, light sources, spec	ll measuring methods o troscopic methods and	f physical metrology measured value acq	, vacuum technology uisition.	/ and cryoge-
Intende	ed lear	ning outcomes		·		
The stu cal met red val	The students have acquired the following transferable skills: Electronic and optical measuring methods in physi- cal metrology, cryogenics and vacuum technology, cryogenics, light sources, spectroscopic methods and measu- red value acquisition.					
Course	S (type, r	number of weekly contact hou	rs, language — if other than Ge	rman)		
V + Ü (no information on SWS (weekly contact hours) and course language available)						
Metho 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
written	exami	nation (approx. 120 mi	nutes)			
Allocat	ion of _l	olaces				
Only as	s part o	f pool of general key s	kills (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Additio	onal inf	ormation				
Worklo	ad					
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulat	ions for teaching-degree progra	ammes)		
Module	e appea	ars in				
Bachelor' degree (1 major) Physics (2007) 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) Nanostructure Technology (2010)						
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu reg. data reg.	rrg • generated 26-Aug-2024 ord Bachelor (180 FCTS) Phys	• exam. ik - 2010	page 243 / 250
			7cg. uutu 1ett		2010	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Bachelor' degree (1 major) Nanostructure Technology (2012) Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007) Master's degree (1 major) Technology of Functional Materials (2010) Master's degree (1 major) Technology of Functional Materials (2009) Master's degree (1 major) Functional Materials (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 244 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	

Module title Abb				Abbreviation			
Key Qualifications 11-BSQ5-112-m01			11-BSQ5-112-m01				
Module coordinator				Module offered by			
chairpe	erson o	f examination committee		Faculty of Physics a	ind Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites	uisites			
1 seme	ster	undergraduate	Approval by examin	ation committee req	uired.		
Conten	ts						
Transfe	rable s	kills. Accredited academ	ic achievements, e.g	. in case of change o	f university or study abroad		
Intende	ed leari	ning outcomes					
The stu lor's pr	dents l ogramr	nave competencies corre ne.	sponding to the requ	irements of a transfe	erable skills module of the Bache-		
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)			
V + R (n	infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
Method	d of ass	essment (type, scope, langua	ge — if other than German, o	examination offered — if no	ot every semester, information on whether		
module is creditable for bonus)							
a) writt in grou weeks) Langua	en exaı ps (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cand resentation/seminar pre ssessment: German, Eng	nutes) or b) oral exar didate) or c) project re sentation (approx. 30 lish	nination of one canc eport (approx. 8 to 1 o minutes)	lidate each or oral examination o pages, time to complete: 1 to 4		
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	Module appears in						
Bachel	or' deg	ree (1 major) Physics (20:	10)				

Module title					Abbreviation	
Key Qualifications					11-BSQ6-112-m01	
Module coordinator				Module offered by		
chairpe	erson o	f examination committee	-	Faculty of Physics a	ind Astronomy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites	ther prerequisites		
1 seme	ster	undergraduate	Approval by examin	ation committee req	uired.	
Conten	ts					
Transfe	rable s	kills. Accredited academ	ic achievements, e.g.	in case of change o	f university or study abroad	
Intende	ed learı	ning outcomes				
The stu lor's pr	dents l ogramr	nave competencies corre ne.	sponding to the requ	irements of a transfe	erable skills module of the Bache-	
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	ourse language avail	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	ot every semester, information on whether	
a) writte in grou weeks) Langua	en exar ps (app or d) p ge of a	nination (approx. 120 mi prox. 30 minutes per cano resentation/seminar pressentation/seminar pressentation/seminar pressentation/seman, Eng	nutes) or b) oral exar didate) or c) project re sentation (approx. 3c lish	nination of one cand eport (approx. 8 to 10 minutes)	lidate each or oral examination o pages, time to complete: 1 to 4	
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	Module appears in					
Bachel	or' deg	ree (1 major) Physics (201	10)			

Module title					Abbreviation	
Electronics 11-A2-092-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			Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester undergraduate		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 coils ar cuits: d	les of e nd diod lifferen	lectronic components les) and active compor t types of gates and CA	and circuits. Analogous ents (bipolar and field 10S circuits. Microcont	s circuit technology: -effect transistors, op roller	Passive (resistors, ca perational amplifiers	apacitors,). Digital cir-
Intende	ed lear	ning outcomes				
The stu circuit f	dents l techno	have knowledge of the logy.	practical setup of elect	ronic circuits from th	ne field of analogous	and digital
Course	Courses (type, number of weekly contact hours, language — if other than German)					
V + Ü (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)						
written Assess and wil examin	examin ment o Il be an nation r	nation (approx. 90 min ffered: When and how nounced in due form u egulations) 2009.	utes) often assessment will l nder observance of Se	be offered depends offered solution 32 Subsection	on the method of ass 3 ASPO (general aca	sessment demic and
Allocation of places						
Only as part of pool of general key skills (ASO): 15 places. Places will be allocated by lot						
Additio	nal inf	ormation			•	
Worklo	ad					
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)						
Master's degree (1 major) Physics (2011)						
Bachelor's	with 1 ma	jor Physics (2010)	JMU Würzbu	rg • generated 26-Aug-2024	• exam.	page 247 / 250
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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)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 248 / 250
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Module title				Abbreviation		
Computational Physics				11-A1-092-m01		
Module coordinator				Module offered by		
Managing Director of the Institute of Theoretical Ph and Astrophysics			Theoretical Physics	Faculty of Physics 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		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 for admission to assessment anew.			
Conten	ts		- -			
 Introd numer simula genera rando many- Intende The stu They has solution Courses V + Ü (r Method module is written Assessi and wil examin 	uction rical so ation of ation o m walk particle ed learn dents l ave kno n of ph s (type, n no infor d of ass creditab examin ment o l be an ation r	to programming on the lution of differential ed f chaotic systems f random numbers e processes and reacting outcomes nave knowledge of two wledge of numerical s ysical problems, e.g. a umber of weekly contact hour mation on SWS (week sessment (type, scope, lang le for bonus) nation (approx. 120 mi ffered: When and how nounced in due form u egulations) 2009.	e basis of C++ / Java /N quations on diffusion model major programming la tandard methods and a lgorithms for solving nu rs, language — if other than Ge guage — if other than German, nutes) often assessment will l inder observance of Sec	nguages and know a are able to apply com umerical problems of rman) ourse language avail examination offered — if no be offered depends of ction 32 Subsection	Ilgorithms important iputer-assisted proc f Physics. able) of every semester, information on the method of ass 3 ASPO (general aca	for Physics. esses to the ion on whether sessment demic and
Allocat	ion of p	olaces				
Only as	part o	f pool of general key sl	kills (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Additio	nal inf	ormation				
Workload						
Teachir	ıg cycl	9				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
[]						
Bachelor's	Bachelor's with 1 major Physics (2010) JMU Würzburg • generated 26-Aug-2024 • exam. page 249 / 250 reg. data record Bachelor (180 ECTS) Physik - 2010					

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) Bachelor' degree (1 major) Mathematical Physics (2009) Bachelor' degree (1 major) Mathematical Physics (2012) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2010)

Bachelor's with 1 major Physics (2010)	JMU Würzburg • generated 26-Aug-2024 • exam.	page 250 / 250
	reg. data record Bachelor (180 ECTS) Physik - 2010	