

Module Catalogue

for the Subject

Nanostructure Technology

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

Examination regulations version: 2008 Responsible: Faculty of Physics and Astronomy

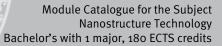
JMU Würzburg • generated 11-Jan-2023 • exam. reg. data record 82|224|-|-|H|2008

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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(2008)	ta record Bachelor (180 ECTS) Nanostrukturtechnik - 2008	





Introduction Course Mathematics



The subject is divided into

section / sub-section	ECTS credits	starting page
Compulsory Courses	132	7
Nanostructure Technology	12	8
Lab Course Engineering	18	11
Mathematics for Engineers	26	16
Chemistry	10	21
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Thesis	10	48
Subject-specific Key Skills	14	50



Content and Objectives of the Programme

The goal of the studies is it to mediate knowledge on the most important subsections of the Nanostructure Technology and to make the students familiar with the methods of engineering 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 physical and chemical terms and laws as well as on basic engineeringscientific knowledge and the development of the typical scientific thinking and working structures. During the Bachelor thesis the student should work on an thematic and temporally limited experimental or theoretical engineering-scientific task in the field of Nanostructure Technology using well-known procedures and scientific criteria under guidance to a large extent independently.

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:

ASP02007

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

03-Sep-2009 (2009-28)

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



Compulsory Courses

(132 ECTS credits)



Nanostructure Technology

(12 ECTS credits)

Module title Abbreviation					Abbreviation
Basics	of Nan	ostructureTechnology		11-N1-072-m01	
Modul	e coord	inator		Module offered by	I
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	ind Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
6	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	nts		l		
		producing, characterisi	ng and applying nanos	tructures.	
		ning outcomes	<u> </u>		
The stu	udents		fundamental propertie	s, technologies, cha	racterising methods and functi-
Course	es (type, r	number of weekly contact hou	rs, language — if other than Ge	rman)	
V + S (I	no infor	mation on SWS (week	ly contact hours) and co	ourse language avail	able)
module i written	s creditab exami	le for bonus) nation (approx. 90 mir			ot every semester, information on whether
Allocat	tion of _l	olaces			
	_				
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulat	ions for teaching-degree progra	ammes)	
Modul	e appea	ars in			
		ree (1 major) Physics (
			gy of Functional Materia		
	-	-	gy of Functional Materia cture Technology (2008		
			cture Technology (2008 cture Technology (2007		
	-		•, • ,)	
Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008) Bachelor' degree (1 major) Technology of Functional Materials (2006)					

Module title					Abbreviation	
Basic e	Basic electronics with laboratory course 11-N2-082-m01					
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of Ap	oplied 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	i		
1 seme	ster	undergraduate				
Conten	ts		· · · · · · · · · · · · · · · · · · ·			
Princip techno		bassive and active electro	onic components and	their application in	analogous and digital circuit	
Intende	ed lear	ning outcomes				
The stu circuit 1			ractical setup of elect	ronic circuits from th	ne field of analogous and digital	
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ge	rman)		
V + P (r	o infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		Sessment (type, scope, langua Ile for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
written	exami	nation (approx. 90 minut	es)			
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	ammes)		
Module	e appea	ars in				
		ree (1 major) Nanostructu	ure Technology (2008	3)		
Bachel	or's de	gree (1 major, 1 minor) Pł	nysics (Minor, 2008)			



Lab Course Engineering

(18 ECTS credits)

Module title			Abbreviation		
Advanced Practical Course Bachelor			11-PFB-072-m01		
Module	coord	inator		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	pl. of module(s)	
4	(not) s	successfully completed	11-E1, 11-E2		
Duratio	n	Module level	Other prerequisites		
1 semes	ster	undergraduate	11-A3		
Conten	ts				
		luclear, Atomic and Mole ties of solids, surfaces ar		ments on cryogenic t	emperatures and correlated sy-
Intende	ed leari	ning outcomes			
results.	They h	-	issuing a scientific pu	ublication and of using	l documenting the experimental ng modern evaluation systems. xperimental methods.
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Fortgeschrittenen-Praktikum Bachelor Theorie (Advanced Practical Course Bachelor Theory): S (1 weekly contact hour) Fortgeschrittenen-Praktikum Bachelor Praxis (Advanced Practical Course Bachelor Practice): P (3 weekly contact hours)					
		s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether
 This module has the following assessment components Seminar: talk (with discussion) demonstrating the students' understanding of the physics-related aspects of the experiments to be prepared (approx. 30 minutes) Lab course: Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. Students must prepare an experiment log (8 to 10 pages). Students must register for assessment components 1 and 2 online (details to be announced). 					
		iodule, students must pa	ss both assessment	component 1 and as	sessment component 2.
Allocati		παιτο			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	
Module appears in					
Bachelor' degree (1 major) Physics (2007) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007)					
Duchell	Dachelor degree (1 major) Nanostructure recimology (2007)				

Module	e title				Abbreviation				
Advanc	ed Und	lergraduate Laboratory (Classical Mechanics,	Thermodynamics,	11-PGA-NN-072-m01				
Basic C	ircuitr	y)							
Module	e coord	inator		Module offered by					
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy				
ECTS	Meth	od of grading	Only after succ. com	pl. of module(s)					
4	(not) s	successfully completed							
Duratio	on	Module level	Other prerequisites						
1 seme	ster	undergraduate	Recommended: 11-P	PFR					
Conten	ts								
Physica	al laws	of mechanics, thermody	namics, optics, scien	ce of electricity, vibr	ations and waves.				
Intende	ed lear	ning outcomes							
are abl	e to ind				experimental techniques. They hers, and to document the results				
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)					
BAM): I Klassis	P (2 we che Ph	Mechanik, Wärmelehre ı ekly contact hours) ysik (Classical Physics, K hre und Schaltungen (Ele	LP): P (2 weekly conta	act hours)	hermodynamics and Electricity, ntact hours)				
		sessment (type, scope, langua ole for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether				
phys 2. Lab o ly co phys Studen Studen nent, th To pass	ics-rela course mplete ics-rela ts mus ts will ney mu s this n	ated contents of the cours in part 2: a) Preparing, pe d if a Testat (exam) is para ated contents of the cours t register for assessment be offered one opportuni st pass both elements a) nodule, students must su	se (approx. 30 minute erforming and evaluat ssed. b) Talk (with dis se (approx. 30 minute components 1 and 2 ty to retake element a and b). ccessfully complete t	es). ting the experiments scussion) to test the es). online (registration a) and/or element b) two out of the three o					
		nodule, students must pa	ss both assessment	component 1 and as	sessment component 2.				
Allocat		JIACES							
Additio	nal inf	ormation							
Worklo	ad								
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)					
				Referred to in LPO I (examination regulations for teaching-degree programmes)					
	annos	are in							
Module	apped								
Module Bachel			ıre Technology (2008)					
Bachel	or' deg	ree (1 major) Nanostructu ree (1 major) Nanostructu ree (1 major) Nanostructu							

Module title					Abbreviation
Advanc	Advanced Undergraduate Laboratory (Optics, Basic Semiconductor Circuits) 11-PGB-NRN-072-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. con	npl. of module(s)	
2	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
		of atomic physics, nuclea scilloscopes.	ar physics and wave	optics. Basic measu	ring methods using computers
Intende	ed learı	ning outcomes			
are able	e to inc				experimental techniques. They hers, and to document the results
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	
Atom- ι Compu Methoc	ind Ker ter und I of ass	essment (type, scope, langua	clear Physics, AKP): P s and Measurement	(2 weekly contact h Technology, CMT): P	ours) (2 weekly contact hours) ot every semester, information on whether
 module is creditable for bonus) This module has the following assessment components Lab course: 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 online (registration deadline to be announced). Students will be offered one opportunity to retake element a) and/or element b). To pass an assessment, students must pass both elements a) and b). To pass this module, students must successfully complete one out of the three courses. To pass this module, students must pass the assessment components. 					
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
Module	appea	irs in			
Bachelo	or' deg	ree (1 major) Nanostructu ree (1 major) Nanostructu gree (1 major, 1 minor) Pł	ire Technology (2007		

Module title Abbreviation					Abbreviation				
Industrial Internship 11-PFI-072-m01					11-PFI-072-m01				
Module	e coord	linator		Module offered by					
Manag	ing Dir	ector of the Institute of Ap	oplied Physics	Faculty of Physics	and Astronomy				
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)					
8	(not)	successfully completed							
Duratio	on .	Module level	Other prerequisites						
1 seme	ster	undergraduate							
Conten	ts	•							
		ndustrial methods, work a report and an oral prese		l production method	ds. Summary of own experiences				
Intend	ed lear	ning outcomes							
		e ,	•	e ,	ustrial technologies with relevan- report and an oral presentation.				
		number of weekly contact hours, I							
P + S (r	no info	rmation on SWS (weekly o	contact hours) and co	ourse language avai	lable)				
		Sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if n	ot every semester, information on whether				
		oort / fieldwork report / re ical course (20 pages)	eport on practical trai	ning / report on pra	ctical course / project report / re-				
Allocat		• -	-						
		·							
Additio	onal inf	ormation	-						
Worklo	ad								
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)					
 Modula	anne	arc in							
			re Technology (2008	Module appears in					
Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007)									



Mathematics for Engineers

(26 ECTS credits)

Module title					Abbreviation	
Mathe	matics	3 for students of Physi	cs and Engineering		11-MPI3-062-m01	
Modul	e coord	inator		Module offered by	I	
Manag		ector of the Institute of	Theoretical Physics	Faculty of Physics a	and Astronomy	
	1	od of grading	Only after succ. con	npl. of module(s)		
8	1	rical grade				
Duratio		Module level	Other prorequisites			
1 seme	ester	undergraduate	50% of exercises. Certain prerequisites must be met to qualify for sion to assessment. The lecturer will inform students about the ve details at the beginning of the course. Registration for the co- be considered a declaration of will to seek admission to assess students have obtained the qualification for admission to assess over the course of the semester, the lecturer will put their regist assessment into effect. Students who meet all prerequisites wil mitted to assessment in the current or in the subsequent semes assessment at a later date, students will have to obtain the qua			fy for admis- he respecti- course will essment. If sessment distration for will be ad- nester. For
Conter	nts		for admission to ass	sessment anew.		
Ordina	ry and	partial differential equa	ations in Physics.			
Intend	ed lear	ning outcomes				
partial	differe	have basic mathematic ntial equations. number of weekly contact hour			lution methods for co	ommon and
V + Ü (*	no info	rmation on SWS (weekl	y contact hours) and co	ourse language avail	able)	
Metho	d of as	Sessment (type, scope, lang le for bonus)	·			on on whether
written	ı exami	nation (approx. 120 mii	nutes)			
Allocat	tion of	places				
Additio	onal inf	ormation				
Worklo	oad					
_	ed to in	LPO I (examination regulati	ons for teaching-degree progra	ammes)		
Referre						
Referre						
	o 2000	arcin				
 Modul	e appea		2007)			
 Modul Bachel	lor' deg	ree (1 major) Physics (2				
 Modul Bachel Bachel	lor' deg lor' deg	ree (1 major) Physics (2 ree (1 major) Physics (2	2009)			
 Modul Bachel Bachel Bachel	lor' deg lor' deg lor' deg	ree (1 major) Physics (2	2009) 2008)	als (2009)		
 Modul e Bachel Bachel Bachel Bachel	lor' deg lor' deg lor' deg lor' deg	ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Physics (2	2009) 2008) gy of Functional Materia	-		
 Modul Bachel Bachel Bachel Bachel Bachel	lor' deg lor' deg lor' deg lor' deg lor' deg	ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Technolog	2009) 2008) gy of Functional Materia gy of Functional Materia	als (2010)		
 Modul Bachel Bachel Bachel Bachel Bachel Bachel	lor' deg lor' deg lor' deg lor' deg lor' deg lor' deg lor' deg	ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Technolog ree (1 major) Technolog ree (1 major) Nanostruc ree (1 major) Nanostruc	2009) 2008) gy of Functional Materia gy of Functional Materia cture Technology (2010 cture Technology (2012	als (2010)))		
 Modul Bachel Bachel Bachel Bachel Bachel Bachel Bachel	lor' deg lor' deg lor' deg lor' deg lor' deg lor' deg lor' deg lor' deg	ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Technolog ree (1 major) Technolog ree (1 major) Nanostruc ree (1 major) Nanostruc ree (1 major) Nanostruc	2009) 2008) gy of Functional Materia gy of Functional Materia cture Technology (2010 cture Technology (2012 cture Technology (2008	als (2010))) 3)		
 Modul Bachel Bachel Bachel Bachel Bachel Bachel Bachel	lor' deg lor' deg lor' deg lor' deg lor' deg lor' deg lor' deg lor' deg	ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Physics (2 ree (1 major) Technolog ree (1 major) Technolog ree (1 major) Nanostruc ree (1 major) Nanostruc	2009) 2008) gy of Functional Materia gy of Functional Materia cture Technology (2010 cture Technology (2012 cture Technology (2008	als (2010))) 3)		



Bachelor' degree (1 major) Functional Materials (2012) Bachelor' degree (1 major) Technology of Functional Materials (2006)

Module coord Dean of Stud ECTS Meth 10 num Duration 1 semester Contents Basics on nu	ies Mathematik (Mathen od of grading erical grade Module level undergraduate			10-M-NST1-072-m01 natics
Dean of Stud ECTS Meth 10 num Duration 1 semester Contents Basics on nu	ies Mathematik (Mathen od of grading erical grade Module level undergraduate	Only after succ. con Other prerequisites	Institute of Mathen npl. of module(s)	natics
ECTSMeth10numDuration1 semesterContentsBasics on nu	erical grade Module level undergraduate	Only after succ. con Other prerequisites	npl. of module(s)	natics
10numDuration1 semesterContentsBasics on nu	erical grade Module level undergraduate	 Other prerequisites		
Duration 1 semester Contents Basics on nu	Module level undergraduate	1	;	
1 semester Contents Basics on nu	undergraduate	1	5	
Contents Basics on nu				
Basics on nu	mbors and functions, so			
	mbors and functions so			
spaces, simp	le differential equations	•	ifferential and integ	al calculus in one variable, vector
Intended lea	rning outcomes			
able to interp	in natural and engineer pret the results. number of weekly contact hours			nostructure technology, and is
V + Ü (no info	ormation on SWS (weekly	v contact hours) and co	ourse language avai	lable)
Method of as module is credita		uage — if other than German,	examination offered — if no	ot every semester, information on whether
written exam	ination (90 minutes)			
Allocation of	places			
Additional in	formation			
Workload				
Referred to in	n LPO I (examination regulatio	ns for teaching-degree progra	ammes)	
 Module appe	ears in			
	gree (1 major) Nanostruc gree (1 major) Nanostruc	•, .		

Module title					Abbreviation	
Mather	Mathematics 2 for students in Nanostructural Engineering 10-M-NST2-072-m01					
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Mathematik (Mathema	atics)	Institute of Mathen	natics	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
		nd systems of linear equ variables, differential eq			y, differential and integral calcu-	
Intende	ed lear	ning outcomes				
techno Course	logy, a s (type, r	nd is able to interpret the	e results. anguage — if other than Ger	man)	ar in the field of nanostructure	
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avai	lable)	
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
written	exami	nation (90 minutes)				
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	immes)		
Module	e appea	ars in				
	-	ree (1 major) Nanostructu				
Bachel	or' deg	ree (1 major) Nanostructu	ire Technology (2007)		



Chemistry (10 ECTS credits)

Module title			Abbreviation			
General Chemistry for Physics and Engineers			08-CP1-072-m01			
Module	coordi	nator		Module offered by		
lecturer	ofthe	course		Institute of Inorgani	ic Chemistry	
ECTS	Metho	d of grading	Only after succ. com	pl. of module(s)		
10	numer	rical grade				
Duratio	n	Module level	Other prerequisites			
1 semes	ster	undergraduate				
Conten	ts					
		iscusses the fundamenta pportunity to learn esser			c chemistry. The lab course gives nents.	
Intende	d learr	ing outcomes				
to expla cal form	ain bas nulas to	ic models of the structure	e of matter. They have tions and to interpret	e developed the abil them by identifying	formation from it. They are able ity to use the language of chemi- the type of reaction. They are ab- lve them.	
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)		
compor • 0 • 0	 This module comprises 3 module components. Information on courses will be listed separately for each module component. o8-IOC-1-072: V (no information on SWS (weekly contact hours) and course language available) o8-CP1-1-072: V (no information on SWS (weekly contact hours) and course language available) o8-CP1-3-072: P (no information on SWS (weekly contact hours) and course language available) 					
			ge — if other than German, e	examination offered — if no	t every semester, information on whether	
module is creditable for bonus) Assessment in this module comprises the assessments in the individual module components as specified be-						
	less sta	ated otherwise, successf			successful completion of all indi-	
 Assessment in module component o8-IOC-1-o72: Organic Chemistry for students of medicine, biomedicine, dental medicine, engineering and natural science 3 ECTS, Method of grading: numerical grade written examination (approx. 60 minutes) Assessment in module component o8-CP1-1-o72: Basics of General an Inorganic Chemistry 5 ECTS, Method of grading: numerical grade written examination (60 minutes) Assessment in module component o8-CP1-3-o72: General and Analytical Chemistry (lab) 2 ECTS, Method of grading: (not) successfully completed for each experiment: Vortestate (pre-experiment exams, approx. 10 minutes each), assessment of practical performance (log, 2 to 5 pages), Nachtestate (post-experiment exams, approx. 10 minutes each) Assessment offered: once a year, summer semester Only after successful completion of module component o8-CP1-3. 						
Allocati	ion of p	laces				
Additio	nal info	ormation				
Worklo	ad					

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

Module appears in

Bachelor' degree (1 major) Physics (2007) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Nanostructure Technology (2007) Master's degree (1 major) Physics (2010) No final examination (2010)



Experimental Physics

(42 ECTS credits)

Module title Abbreviation					Abbreviation
Experir ons)	nental	Physics 1 (Mechanics, Th	ermodynamics, Wav	es and Oscillati-	11-E1-072-m01
Module	e coord	inator		Module offered by	,
			Faculty of Physics	and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	pl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
Physica	al laws	of mechanics, vibrations	and waves, thermod	ynamics	
		ning outcomes	. ·	, ,	
			texts and principles	of mechanics, vibra	tion, waves and thermodynamics.
		number of weekly contact hours, l			
		rmation on SWS (weekly o			ilable)
Metho	d of as	·			ot every semester, information on whether
written	exami	nation (approx. 120 minu	tes)		
Allocat	ion of	places			
Additio	nal inf	ormation			
Worklo	ad				
Referre	ed 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	07)		
		ree (1 major) Physics (200			
	-	ree (1 major) Physics (200	-		
	-	ree (1 major) Nanostructu			
	-	ree (1 major) Nanostructu)	
Bachel	or's de	gree (1 major, 1 minor) Pł	ysics (Minor, 2008)		

Module title					Abbreviation	
Experii	mental	Physics 2 (Electrics an	d Magnetism)		11-E2-072-m01	
Modul	e coord	inator		Module offered b	y	
Managing Director of the Institute of Applied Physics			Applied Physics	Faculty of Physics	and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade		-		
Duratio		Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten		1				
		of the science of elect	ricity, magnetism, elect	romagnetic vibratio	ons and waves	
		ning outcomes	interior, magnetism, eteet			
The stu	udents		ontexts and principles	of science of electi	ricity, magnetism, electromagnetio	
			rs, language — if other than Ge	rman)		
V + Ü (I	no info	rmation on SWS (week	ly contact hours) and co	ourse language ava	ailable)	
			<u> </u>		not every semester, information on whether	
		ble for bonus)	, , , , , , , , , , , , , , , , , , ,		,,	
written	exami	nation (approx. 120 mi	nutes)			
Allocat	ion of	places				
Additio	onal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulat	ions for teaching-degree progra	ammes)		
				/		
Module	e appea	ars in				
		ree (1 major) Physics (2	2007)			
Bachel	or' deg	ree (1 major) Physics (2	2009)			
	-	ree (1 major) Physics (2				
	-		cture Technology (2008			
	-	-	cture Technology (2007)		
Bachel	or's de	gree (1 major, 1 minor)	Physics (Minor, 2008)			

Module title					Abbreviation	
Experii Physic		Physics 3 (Optics, Quan	tum Phenomena, Int	roduction Atomic	11-E3-072-m01	
-	e coord	inator		Module offered by	/	
Manag	anaging Director of the Institute of Applied Physics Faculty of Physics				and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisite	5		
1 seme	ester	undergraduate				
Conter	nts					
Physic	al laws	of optics, quantum pher	omena, introductior	to Atomic Physics.		
		ning outcomes	,			
	udents		asic contexts and pri	nciples of optics, qu	uantum phenomena and Atomic	
Course	S (type, r	number of weekly contact hours,	language — if other than Ge	erman)		
V + Ü (no info	rmation on SWS (weekly	contact hours) and c	ourse language ava	ilable)	
module i	s creditab	le for bonus)		examination offered — if	not every semester, information on whether	
		nation (approx. 120 minu	ites)			
Allocat	tion of _l	places				
Additio	onal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progr	rammes)		
Modul	e appea	ars in				
	-	ree (1 major) Mathematio				
	-	ree (1 major) Mathematio				
	0	ree (1 major) Physics (20				
	-	ree (1 major) Physics (20				
	-	ree (1 major) Physics (20				
	-	ree (1 major) Nanostruct				
	-	ree (1 major) Nanostruct				
	-	ree (1 major) Computatio		•		
васне	or's de	gree (1 major, 1 minor) Pl	nysics (Minor, 2008)			

Module	e title		Abbreviation		
		Physics ⁊ (Solid State Ph gnetism])	nenomena [Semicono	ductor, Supercon-	11-E7-072-m01
Module	e coord	linator	1		
Manag	ing Dir	ector of the Institute of A	pplied Physics	Module offered by Faculty of Physics	1
ECTS	Г ⁻	od of grading	Only after succ. cor	·	
4	1	rical grade			
, Duratio		Module level	Other prerequisites	5	
1 seme		undergraduate			
Conten					
		of colid state phonomon	a (comiconductors d	superconductivity n	ananatism)
		of solid-state phenomen ning outcomes		superconductivity, fi	
	ogical r				erfaces; superconductivity: pheno mean field description of magne-
Course	S (type, 1	number of weekly contact hours,	language — if other than Ge	rman)	
V + Ü (ı	no info	rmation on SWS (weekly	contact hours) and c	ourse language avai	ilable)
		Sessment (type, scope, langua ole for bonus)	age — if other than German,	examination offered — if r	not every semester, information on whether
written	exami	nation (approx. 120 minu	ites)		
Allocat	ion of	places			
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ammes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Physics (20	07)		
	-	ree (1 major) Physics (20	•		
	-	ree (1 major) Physics (20		->	
	-	ree (1 major) Nanostructu			
	-	ree (1 major) Nanostructu	e , , ,	7)	
васпеі	or s ae	gree (1 major, 1 minor) Pł	iysics (winor, 2008)		

Module title Abbreviation					Abbreviation	
Experimental Physics 5 (Introduction to Solid State Physics) 11-E5-082-m01						
Module	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of A	oplied Physics	Faculty of Physics	and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	pl. of module(s)		
8	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
		of solids: Bonding and s lectron gas)	tructure, lattice dyna	mics, thermal prope	erties, principles of electronic pro-	
Intende	ed lear	ning outcomes				
		have knowledge of the ba properties, principles of			onding and structure, lattice dyna-	
Course	S (type, r	number of weekly contact hours,	language — if other than Gei	man)		
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avai	ilable)	
		Sessment (type, scope, langua Ile for bonus)	ge — if other than German,	examination offered — if r	ot every semester, information on whether	
written	exami	nation (approx. 120 minu	ites)			
Allocat						
Additio	nal inf	ormation	-			
Worklo	ad					
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	mmes)		
			0 = -0.10 p.0000	/		
Module	appea	ars in				
Bachel Bachel	or' deg or' deg	ree (1 major) Physics (20 ree (1 major) Nanostructi	ure Technology (2008			
	-	ree (1 major) Computatio gree (1 major, 1 minor) Pl		09)		

Module	Module title Abbreviation					
Experir	nental	Physics 4 (Physics of Ato	oms and Molecules)		11-E4-082-m01	
Module coordinator Module offered by						
Manag	ing Dire	ector of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts		<u>.</u>			
Physica	al laws	of Atomic and Molecular	Physics.			
Intende	ed lear	ning outcomes				
Quantu	ım mec	hanical atom model, one	e/multi-electron atom	is, electronic dipole	d Molecular Physics (atoms: transitions, atoms in B field as itions, electronic excitations)	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)		
V + Ü (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	lable)	
		Sessment (type, scope, langua Ile for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
written	exami	nation (approx. 120 minu	tes)			
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	immes)		
Module	e appea	ars in				
	-	ree (1 major) Physics (20				
	-	ree (1 major) Nanostructu	•, .)		
Bachel	or's de	gree (1 major, 1 minor) Pł	nysics (Minor, 2008)			



Theoretical Physics

(16 ECTS credits)

Module	e title				Abbreviation
Theore	tical Pl	nysics 1 (Theoretical Mec	hanics)		11-T1-072-m01
Module coordinator				Module offered by	
Manag and As		ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	and Astronomy
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites	i	
1 seme	ster	undergraduate			
Conten	ts				
Newtor	nian me	echanics, Lagrangian med	hanics. Hamiltonian	equation of motion	. conservation laws.
		ning outcomes	,		
	Idents		inciples of classical	theoretical mechani	cs and the required calculation
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)	
V + Ü (I	no info	rmation on SWS (weekly o	contact hours) and co	ourse language avail	lable)
module is	exami	le for bonus) nation (approx. 120 minu			ot every semester, information on whether
Additio	nal inf	ormation			
Worklo	ad				
Referre	ed to in	LPOI (examination regulations	s for teaching-degree progra	ammes)	
Module	e appea	ars in			
Bachel	or' deg	ree (1 major) Mathematic	s (2008)		
	-	ree (1 major) Mathematic			
	-	ree (1 major) Physics (200	-		
	-	ree (1 major) Physics (200			
	-	ree (1 major) Physics (200		、	
		ree (1 major) Nanostructu			
		ree (1 major) Nanostructu			
		ree (1 major) Computatio		09)	
Bachel	or's de	gree (1 major, 1 minor) Ph	iysics (Minor, 2008)		

Module title					Abbreviation
Theore	tical P	hysics 3 (Theoretical Q	uantum Mechanics)		11-T3-072-m01
Module	Module coordinator			Module offered by	, ,
	Managing Director of the Institute of Theoretical Physics and Astrophysics		Faculty of Physics	and Astronomy	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites	5	
1 seme	ster	undergraduate			
Contents					
oscillat	tor, ang	sical physics, Schröding gular momentum and s ning outcomes	- ,		f quantum mechanics, harmonic s.
			principles of quantum	machanics and the	required calculation methods
					required calculation methods.
		number of weekly contact hour rmation on SWS (weekl			1-1-1-)
module is	s credital	sessment (type, scope, lang ble for bonus) nation (approx. 120 mil		examination offered — if n	ot every semester, information on whether
Allocat					
		<u>.</u>			
Additio	onal inf	ormation			
Worklo	ad				
Referre	ed to in	LPO I (examination regulati	ons for teaching-degree progr	ammes)	
			<u>0 · · 0 · · P· · 0</u> .		
Module	e appe	ars in			
		ree (1 major) Mathema	tics (2008)		
	-	ree (1 major) Mathema			
	-	ree (1 major) Physics (2			
	-	ree (1 major) Physics (2			
	-	ree (1 major) Physics (2		,	
	-	ree (1 major) Nanostruo	•, •		
		ree (1 major) Nanostruc			
		ree (1 major) Computat		109)	
Bachel	or's de	gree (1 major, 1 minor)	Physics (Minor, 2008)		

Module title Abbreviation					
Theore	etical Pl	nysics 3 FOKUS (Theore	tical Quantum Mecha	nics)	11-T3F-072-m01
Modul	e coord	inator		Module offered	i by
	ging Dire	ector of the Institute of sics	Theoretical Physics	Faculty of Phys	ics and Astronomy
ECTS	Meth	od of grading	Only after succ. cor	mpl. of module(s)
8	nume	rical grade			
Durati	on	Module level	Other prerequisites	5	
1 seme	ester	undergraduate			
Conte	nts				
		sical physics, Schröding gular momentum and sp			ns of quantum mechanics, harmonic Tems
Intend	ed lear	ning outcomes			
The st	udents	have knowledge of the	principles of quantum	mechanics and	the required calculation methods
Course	es (type, r	number of weekly contact hours	, language — if other than Ge	erman)	
V + Ü (no info	rmation on SWS (weekly	/ contact hours) and c	ourse language a	available)
		sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered -	— if not every semester, information on whether
writter	n exami	nation (approx. 120 mir	utes)		
Alloca	tion of _l	olaces			
Additi	onal inf	ormation			
Workle	oad				
Referr	ed to in	LPO I (examination regulation	ons for teaching-degree progr	ammes)	
Modul	e appea	ars in			
		ree (1 major) Physics (2	007)		
	-	ree (1 major) Physics (2	•		
		ree (1 major) Physics (2		- >	
		ree (1 major) Nanostruc			
васпе	ior deg	ree (1 major) Nanostruc	ture lechnology (2007	7)	



Module Comprehensive Tests

(8 ECTS credits)

Module title					Abbreviation
Compr	ehensi	ve Exam in Theoretical Pl	hysics / Nanostructu	re Technology	11-PREN-072-m01
Module coordinator Module offered					y
chairp	erson o	f examination committee		Faculty of Physic	s and Astronomy
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duratio	on	Module level	Other prerequisites	i	
1 seme	ester	undergraduate			
Conter	nts				
					stands the connections between cquired scientific methods.
Intend	ed lear	ning outcomes			
		know the connections be the acquired scientific m		physical and chem	ical terminology and laws and are
Course	es (type, i	number of weekly contact hours,	language — if other than Gei	rman)	
A (no i	nforma	tion on SWS (weekly con	tact hours) and cours	e language availa	ble)
		s essment (type, scope, langua ole for bonus)	age — if other than German,	examination offered — i	f not every semester, information on whether
oral ex	aminat	ion of one candidate eac	h (approx. 30 minute	s)	
Allocat	tion of	places			
Additio	onal inf	ormation			
Worklo	bad				
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	ammes)	
Modul	e appea	ars in			

Module	e title			Abbreviation			
Compr	Comprehensive Exam in Theoretical Physics / Nanostructure Technology 11-PRN-072-mo1						
Module	Module coordinator Module offered by						
chairpe	erson o	f examination committee		Faculty of Physic	s and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
4	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
		of the examination is to d g and is able to apply the			ofound methodological knowledge		
Intend	ed lear	ning outcomes					
The stu fic met		have founded methodolo	gical knowledge in e	ngineering and ar	e able to apply the acquired scienti-		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)			
A (no ir	nforma	tion on SWS (weekly cont	act hours) and cours	e language availa	ble)		
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — i	f not every semester, information on whether		
oral ex	aminat	ion of one candidate eac	h (approx. 30 minute	s)			
Allocat	ion of _l	places					
Additio	onal inf	ormation					
	-						
Worklo	ad						
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	immes)			
Module	e appea	ars in					
	-	ree (1 major) Nanostructu ree (1 major) Nanostructu					



Compulsory Electives

(18 ECTS credits)

Module title Abbreviation								
Nanor	Nanomatrix Inorganic Materials Chemistry 08-NM-AW-072-m01							
Modu	le coord	inator		Module offered by				
Dean Pharm		es Chemie and Pharmazi	e (Chemistry and	Chair of Chemical	Technology of Material Synthesis			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)				
6	nume	rical grade						
Durati	ion	Module level	Other prerequisites	i				
1 sem	ester	undergraduate						
Conte	nts							
engino scieno	eering, e ce, nano	electronics and photonics	s and biophysical app	olications and the te	the application directions power echnology fields of materials ent, in particular in the area of in-			
Intend	led lear	ning outcomes						
		e developed advanced kr neering work, in particula			cation directions or technology istry.			
Cours	es (type, 1	number of weekly contact hours,	anguage — if other than Ge	rman)				
R + V ((no info	mation on SWS (weekly	contact hours) and co	ourse language avail	lable)			
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if n	ot every semester, information on whether			
		mination (approx. 90 mir oral examination in group) oral examination of one candi- rt (approx. 10 pages)			
Alloca	tion of	places						
Additi	ional inf	ormation						
Workl	oad							
Referr	ed to in	LPO I (examination regulation	s for teaching-degree progra	ammes)				
Modu	le appea	ars in						
	-	ree (1 major) Nanostructu ree (1 major) Nanostructu						

Module title Abbreviation										
Nanoparticle Synthesis and Structuring Technologies 08-NM-NS-072-m01										
Modul	le coord	inator		Module offered b	y					
Dean o Pharm		es Chemie and Pharmazi	e (Chemistry and	Chair of Chemica	l Technology of Material Synthesis					
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)						
6	nume	rical grade								
Durati	on	Module level	Other prerequisites	5						
1 seme	ester	undergraduate								
Conte	nts									
engine scienc	eering, e e, nano	electronics and photonic	s and biophysical ap s and components ar	plications and the	n the application directions power technology fields of materials ment, in particular in the area of na-					
Intend	led lear	ning outcomes								
		•	-		ication directions or technology and structuring technologies.					
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)						
V + R (no infoi	mation on SWS (weekly	contact hours) and c	ourse language ava	ailable)					
		sessment (type, scope, langua	age — if other than German,	examination offered — if	not every semester, information on whether					
		mination (approx. 90 min oral examination in group			r c) oral examination of one candi- ort (approx. 10 pages)					
Alloca	tion of _l	places								
Additi	onal inf	ormation								
Workle	oad									
Referr	ed to in	LPOI (examination regulation	is for teaching-degree progra	ammes)						
Modul	le appea	ars in								
	-			Module appears in Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007)						

Module title Abbreviation						
Nanom	Nanomatrix insulation systems and photovoltaics 11-NM-WP-072-m01					
Modul	e coord	inator		Module offered by	,	
Manag	ing Dire	ector of the Institute of A	pplied 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 seme	ester	undergraduate				
Conter	nts		•			
nics, p	hotonio Iring, co	s and biophysics as wel	l as in the technology	-oriented materials	of energy engineering, electro- sciences, technologies of nano- ermal insulation systems and pho	
Intend	ed lear	ning outcomes				
		have advanced knowled he field of thermal insul			ogy areas of engineering work,	
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
V + R (I	no infor	mation on SWS (weekly	contact hours) and co	ourse language avai	ilable)	
Metho	d of ass	sessment (type, scope, langu	age — if other than German,	examination offered — if r	not every semester, information on whether	
module i	s creditab	le for bonus)				
		mination (approx. 90 mi oral examination in group			c) oral examination of one candi- ort (approx. 10 pages)	
Allocat	tion of _l	olaces				
Additio	onal inf	ormation				
Worklo	bad					
Referre	ed to in	LPOI (examination regulation	ns for teaching-degree progra	immes)		
Modul	e appea	ars in				
Bachel	lor' deg	ree (1 major) Nanostruct	ure Technology (2008	3)		
	-	ree (1 major) Nanostruct				
	-	ee (1 major) Technology				
Master	r's degr	ee (1 major) Technology	ot Functional Materia	ls (2009)		

Module title Abbreviation							
Nanom	Nanomatrix semiconductor materials 11-NM-HM-072-m01						
Module	e coord	inator		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	pl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
nics, pl	notonic		as in the technology	-oriented materials s	of energy engineering, electro- sciences, technologies of nano- niconductor materials.		
Intende	ed learı	ning outcomes					
		nave advanced knowledg he field of semiconducto	• • •	lication or technolog	gy areas of engineering work,		
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)		
		s essment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	t every semester, information on whether		
		mination (approx. 90 min ral examination in group			oral examination of one candi- t (approx. 10 pages)		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
Referre	d to in	LPOI (examination regulations	s for teaching-degree progra	mmes)			
Module appears in							
	Bachelor' degree (1 major) Nanostructure Technology (2008)						
	-	ree (1 major) Nanostructu	•, • •				
	•	ee (1 major) Technology c					
Master	Master's degree (1 major) Technology of Functional Materials (2009)						

Module title Abbreviation						
Nanom	Nanomatrix Semiconductor Processing 11-NM-HP-072-m01					
Module	e coord	inator		Module offered by	<u>I</u>	
Manag	ing Dire	ector of the Institute of Ap	plied 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	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	Its					
nics, p	hotonic		as in the technology	-oriented materials	of energy engineering, electro- sciences, technologies of nano- niconductor processes.	
Intend	ed lear	ning outcomes				
		have advanced knowledg he field of semiconducto		lication or technolog	gy areas of engineering work,	
Course	S (type, r	number 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	ourse language avail	able)	
		sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
		mination (approx. 90 min oral examination in group) oral examination of one candi- rt (approx. 10 pages)	
Allocat	ion of j	olaces				
Additio	onal inf	ormation				
	,					
Worklo	ad					
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
Module	e appea	ars in				
		ree (1 major) Nanostructu	re Technology (2008)		
	-	ree (1 major) Nanostructu				
		ee (1 major) Technology o				
Master	's degr	ee (1 major) Technology c	of Functional Material	s (2009)		

Module title Abbreviation							
Princip	Principles Micro/Nano- and Optoelectronic Devices 11-NM-MB-072-mo1						
Module	e coord	inator		Module offered by			
Manag	ing Dir	ector of the Institute of A	oplied Physics	Faculty of Physics a	and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
structu compo	ring, co nents.	omponents and system d			sciences, technologies of nano- cro-/nano- and optoelectronic		
		ning outcomes					
		have advanced knowleds he field of micro-, nano-			gy areas of engineering work,		
Course	S (type, 1	number of weekly contact hours,	anguage — if other than Ge	rman)			
V + R (r	no info	mation on SWS (weekly	contact hours) and co	ourse language avail	able)		
		s essment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if n	ot every semester, information on whether		
		mination (approx. 90 mir oral examination in group) oral examination of one candi- rt (approx. 10 pages)		
Allocat	ion of	places					
Additio	onal inf	ormation					
Worklo	ad						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	immes)			
Module	e appea	ars in					
	-	ree (1 major) Nanostructu ree (1 major) Nanostructu					

Module title Abbreviation							
Nanomatrix Biomedical Materials03-NM-BW-072-m01							
Modul	Module coordinator Module offered by						
•		f examination committee ne Human-Computer Inte		Faculty of Medicine	2		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ester	undergraduate					
Conter	nts						
nics ar	nd phot	onics and biophysical ap	plications as well as	the technology focu	reas power engineering, electro- ses materials science, nanostruc- e area of biomedical materials.		
Intend	ed lear	ning outcomes					
		e developed an advanced with a particular focus of			rea or technology focus of engi-		
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ge	rman)			
V + R (I	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
		essment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
		mination (approx. 90 min ral examination in group) oral examination of one candi- rt (approx. 10 pages)		
Allocat	tion of p	olaces					
Additio	onal inf	ormation					
Worklo	oad						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ammes)			
Modul	e appea	irs in					
	-	ree (1 major) Nanostructu ree (1 major) Nanostructu	•, .				

Module title Abbreviation						
Nanomatrix Biocompatible Structuring Technologies 07-NM-BS-072-m01						
Module	e coord	linator		Module offered by		
Dean o	f Studi	es Biologie (Biology)		Faculty of Biology		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
science biocom	e, nanc Ipatible	e structuring technologie	s and components an		echnology fields of materials ent, in particular in the area of	
		ning outcomes				
		e acquired advanced kno neering work, in particula			tion directions or technology technologies.	
Course	S (type, 1	number of weekly contact hours,	language — if other than Ger	rman)		
V + R (r	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langu ble for bonus)	age — if other than German,	examination offered — if n	ot every semester, information on whether	
		mination (approx. 90 mi oral examination in grou) oral examination of one candi- rt (approx. 10 pages)	
Allocat	ion of	places				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPO I (examination regulation	ns for teaching-degree progra	immes)		
Module	e appea	ars in				
Bachel	-	ree (1 major) Nanostruct ree (1 major) Nanostruct	•, .	3)		

Module title Abbreviation						
Nanomatrix Biophysical Analyzing Systems and Processes 11-NM-BV-072-m01						
Modul	e coord	inator		Module offered b	ру	
Manag	ing Dire	ector of the Institute of	f Applied Physics	Faculty of Physic	s and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Durati	on	Module level	Other prerequisites	;		
1 seme	ester	undergraduate				
Conter	nts		L			
nics, p	hotonio Iring, co	s and biophysics as w	vell as in the technology	-oriented materia	ds of energy engineering, electro- ls sciences, technologies of nano- niophysical analysis systems and	
Intend	ed lear	ning outcomes				
			edge of one or more app l analysis systems and t		logy areas of engineering work,	
Course	es (type, r	number of weekly contact hou	ırs, language — if other than Ge	rman)		
V + R (i	no infoi	mation on SWS (week	ly contact hours) and co	ourse language av	ailable)	
		Sessment (type, scope, lan ole for bonus)	guage — if other than German,	examination offered — i	f not every semester, information on whether	
			minutes) or b) talk (appi oups (approx. 30 minute		r c) oral examination of one candi- port (approx. 10 pages)	
Alloca	tion of _l	places				
Additio	onal inf	ormation				
Worklo	oad					
Referre	ed to in	LPO I (examination regula	tions for teaching-degree progra	ammes)		
Modul	e appea	ars in				
			cture Technology (2008	3)		
	-		cture Technology (2007	-		
	-		gy of Functional Materia			
Master	r's degr	ee (1 major) Technolog	gy of Functional Materia	ls (2009)		



Thesis (10 ECTS credits)

Module title Abbreviation							
Bachel	Bachelor Thesis Nanostructure Technology 11-BA-N-072-m01						
Module coordinator Module offered by							
chairpe	erson o	f examination committee	2	Faculty of Physics	and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
10	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conten	ts						
					task in the field of nanostructure writing of the Bachelor's thesis.		
Intend	ed lear	ning outcomes					
structu	re tech		ce of a supervisor, es	pecially in accordar	nd engineering task from nano- nce with known methods and		
Course	S (type, r	number of weekly contact hours,	language — if other than Gei	rman)			
no cou	rses as	signed					
		Sessment (type, scope, langua ole for bonus)	age — if other than German,	examination offered — if n	ot every semester, information on whether		
written	thesis	(approx. 25 pages)					
Allocat	ion of	places					
Additio	onal inf	ormation					
Worklo	ad						
Referre	ed to in	LPOI (examination regulation	s for teaching-degree progra	immes)			
Module	e appea	ars in					
Bachel	or' deg	ree (1 major) Nanostruct	ure Technology (2010)			
	-	ree (1 major) Nanostruct	•, •				
	-	ree (1 major) Nanostruct					
Bachel	or' deg	ree (1 major) Nanostruct	ure Technology (2007)			



Subject-specific Key Skills

(14 ECTS credits)

Module title					Abbreviation	
Theore	tical Pl	nysics 2 (Theoretical Elec	ctrostatics and Electr	rodynamics)	11-T2-072-m01	
Module coordinator Module offer					by	
Manag and As	-	ector of the Institute of Th sics	neoretical Physics	Faculty of Physi	ics and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s))	
8	nume	rical grade				
Duratio	on in the second	Module level	Other prerequisites	5		
1 seme	ster	undergraduate				
Conten	ts					
Electro	statics.	magnetostatics, Maxwe	ll equations, covaria	nt formulation, e	lectrodynamics and matter.	
		ning outcomes	-,	····· , -·	,	
			rinciples of classical	electrodynamics	and the required calculation me-	
Course	S (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
ı) Ü + V	no infoi	rmation on SWS (weekly	contact hours) and co	ourse language a	available)	
module is	creditab	ile for bonus) nation (approx. 120 minu		examination offered –	- if not every semester, information on whether	
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
	-		_			
Referre	d to in	LPOI (examination regulation	s for teaching-degree progra	ammes)		
Module	appea	ars in				
Bachel	or' deg	ree (1 major) Mathematic	cs (2008)			
	-	ree (1 major) Mathematic				
	-	ree (1 major) Physics (20				
	Bachelor' degree (1 major) Physics (2009)					
	Bachelor' degree (1 major) Physics (2008)					
	-	ree (1 major) Nanostructu				
	-	ree (1 major) Nanostructu				
	-	ree (1 major) Computatio	-	09)		
Bachel	or s de	gree (1 major, 1 minor) Pl	iysics (willor, 2008)			

Module	e title				Abbreviation			
Theoretical Physics 4 (Theoretical Thermodynamics and Statistics) 11-T4-072-m01								
Module coordinator				Module offered	by			
Managing Director of the Institute of Theoretical Physics and Astrophysics			neoretical Physics	Faculty of Physics and Astronomy				
			Only after succ. con	npl. of module(s)				
8	nume	rical grade						
		Other prerequisites	6					
1 seme	ster	undergraduate						
Conten	ts		,					
Princip chanic		hermodynamics, fundam	iental theorems, ther	modynamic pote	ntials, principles of statistical me-			
Intend	ed lear	ning outcomes						
		have knowledge of the p ethods.	rinciples of thermody	namics and stati	stical mechanics and the required			
Course	S (type, 1	number of weekly contact hours,	language — if other than Ge	rman)				
V + Ü (ı	no info	rmation on SWS (weekly	contact hours) and co	ourse language a	vailable)			
		S essment (type, scope, langua ole for bonus)	age — if other than German,	examination offered —	- if not every semester, information on whether			
written	exami	nation (approx. 120 minu	ites)					
Allocat	ion of	places						
Additio	nal inf	ormation						
Worklo	ad							
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	ammes)				
Module	e appea	ars in						
Bachelor' degree (1 major) Mathematics (2008)								
	-	ree (1 major) Mathematio						
Bachelor' degree (1 major) Physics (2007)								
	Bachelor' degree (1 major) Physics (2009)							
		ree (1 major) Physics (20						
		ree (1 major) Nanostruct						
	Bachelor' degree (1 major) Nanostructure Technology (2007)							
Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)								
Sacriel	or s ue	gree (1 major, 1 mmor) Pl	iysics (willor, 2008)					

Module title Abbreviation							
Mathematics 4 for Students of Physics and Engineering 11-MPI4-062-m01							
Modul	e coord	linator		Module offered by	<u> </u>		
Managing Director of the Institute of Theoretical Physics and Astrophysics			eoretical Physics	Faculty of Physics a	and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	pl. of module(s)			
8		rical grade	()				
Duratio	on	Module level	Other prerequisites				
1 seme	ester	undergraduate					
Conter	nts						
Functio	onal an	alysis and complex analy	sis.				
		ning outcomes					
The stu	udents			ert space and the the	eory of functions of a complex va-		
Course	S (type,	number of weekly contact hours, l	anguage — if other than Ge	rman)			
V + Ü (no info	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
		nation (approx. 120 minu	tes)				
Allocat		• •	,				
Additio	onal inf	ormation					
Worklo	ad						
Poforra	d to in	LPO I (examination regulations	for toaching dogroe progra	ummoc)			
Modul	e appe	ars in					
Bachelor' degree (1 major) Physics (2007)							
Bachelor' degree (1 major) Physics (2009)							
Bachelor' degree (1 major) Physics (2008)							
	Bachelor' degree (1 major) Nanostructure Technology (2010)						
	Bachelor' degree (1 major) Nanostructure Technology (2012)						
	Bachelor' degree (1 major) Nanostructure Technology (2008) Bachelor' degree (1 major) Nanostructure Technology (2007)						
Bachel	or' deg	ree (1 major) Nanostructu	ire Technology (2007)			

Module title Abbreviation						
Measurements and Data Analysis 11-PFR-072-m01						
Module coordinator				Module offered by		
Managing Director of the Institute of Applied Physics			oplied Physics	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
2	nume	rical grade				
		Other prerequisites	sites			
1 semester undergraduate						
Conten	ts		с			
		, error approximation and oution functions, significa			average values and standard de- lications.	
Intend	ed lear	ning outcomes	·			
		e, the students acquire su error propagation and the			ave knowledge of practical experi	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)		
V + Ü (r	no infoi	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
written Allocat 	exami ion of J	ile for bonus) nation (approx. 120 minu places ormation	tes)			
Additio	nat inf	ormation				
Worklo	ad					
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) Mathematic	s (2008)			
Bachelor' degree (1 major) Mathematics (2007)						
	Bachelor' degree (1 major) Physics (2007)					
	Bachelor' degree (1 major) Physics (2009)					
		ree (1 major) Physics (20				
		ree (1 major) Nanostructu				
	-	ree (1 major) Nanostructu	•, •, •,			
Bachelor' degree (1 major) Computational Mathematics (2009)						
Bachel	or's de	gree (1 major, 1 minor) Ph	nysics (Minor, 2008)			

Module title Abbreviation						
Computational Physics 11-A1-072-m01						
Module	coord	inator		Module offered by		
Managi and Ast		ector of the Institute of Th sics	eoretical Physics	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	umerical grade				
Duration Module level Other pre			Other prerequisites			
1 seme	ster	undergraduate				
Conten	ts					
		o two of the programminន s with computer program		for students of Phys	ics and Engineering, solving phy-	
Intende	ed lear	ning outcomes				
		have acquired the followi ng with computers, know			of two programming languages, rsical problems.	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Gei	rman)		
V + Ü (r	no infoi	rmation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
written	exami	nation (approx. 120 minu	tes)			
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	immes)		
Module	appea	ars in				
Bachelor' degree (1 major) Physics (2007) Bachelor' degree (1 major) Physics (2009) Bachelor' degree (1 major) Physics (2008) Bachelor' degree (1 major) Nanostructure Technology (2008)						
Bachelor' degree (1 major) Nanostructure Technology (2007) Bachelor's degree (1 major, 1 minor) Physics (Minor, 2008)						

Module title Abbreviation						
Labora	tory an	d Measurement Techno	logy		11-A3-072-m01	
Module	a coord	inator		Module offered by		
Module coordinator			naliad Dhysics	Faculty of Physics a	and Actronomy	
Managing Director of the Institute of Applied Physics			T		and Astronomy	
ECTS		od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester		undergraduate	Admission prerequisite to assessment: successful completion of approx. 50% of exercises. Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.			
Conten	Its			cosment unew.		
		o electronic and optical	measuring methods o	f physical metrology	v. vacuum technolog	v and cryoge-
		cs, light sources, spectre				y and cryoge
		ning outcomes	- ·			
cal met red val	trology, ue acqu	nave acquired the follow cryogenics and vacuum uisition.	technology, cryogeni	cs, light sources, sp		
		number of weekly contact hours,			abla)	
		mation on SWS (weekly	-			
		sessment (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	ot every semester, informat	ion on whether
written	exami	nation (approx. 120 mini	utes)			
Allocat	ion of p	olaces				
Only as	s part o	f pool of general key ski	lls (ASQ): 15 places. P	laces will be allocate	ed by lot.	
Additio	onal inf	ormation				
Worklo	ad					
Referre	ed to in	LPO I (examination regulation	ns for teaching-degree progra	immes)		
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Physics (20	007)			
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)						
	-	ree (1 major) Nanostruct				
Bachel	or aeg	ree (1 major) Nanostruct	ure rechnology (2008) J		
	with 1 ma	or Nanostructure Technology	-	generated 11-Jan-2023 • exa	-	page 56 / 58
(2008)			ta record Bachel	or (180 ECTS) Nanostrukturte	CIIIIK - 2008	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

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)

Module title Abbreviation						
Introduction Course Mathematics 11-MKS-082-mo1						
Module coordinator				Module offered by	<u>,</u>	
Manag	ing Dir	ector of the Institute of Ap	oplied Physics	Faculty of Physics	and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
3	(not)	successfully completed				
Duration Module level		Other prerequisites				
1 seme	ster	undergraduate				
Conten	ts	•				
		nathematics and basic ca d preparation of the mod			urriculum, especially for the intro- ental Physics.	
Intende	ed lear	ning outcomes				
		have knowledge of the pr eoretical and Experiment		tics and elementary	calculation methods which are	
Course	S (type, 1	number of weekly contact hours, I	anguage — if other than Gei	rman)		
V (no ir	nforma	tion on SWS (weekly cont	act hours) and cours	e language availabl	e)	
		s essment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if n	ot every semester, information on whether	
written	exami	nation (approx. 120 minu	tes)			
Allocat	ion of	places				
Additio	nal inf	ormation				
Worklo	ad					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
			• •			
Module	e appea	ars in				
Bachel	or' deg	ree (1 major) Physics (20 ree (1 major) Physics (20				
	-	ree (1 major) Nanostructu)		
	-	gree (1 major, 1 minor) Ph				